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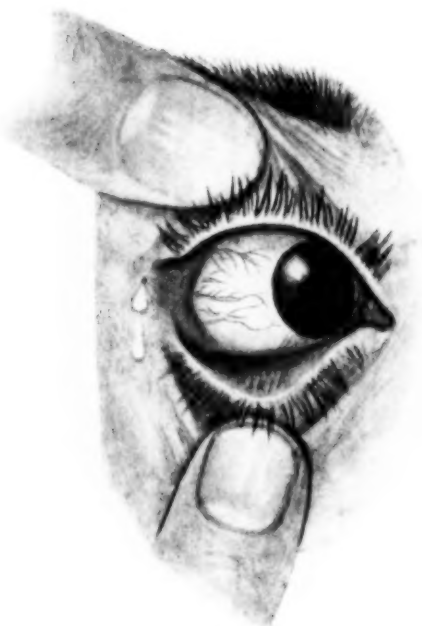

ANOMALY OF EXTERNAL CANTHUS AND DUCT OF LACRIMAL GLAND.
(LING'S CASE)

AMERICAN JOURNAL OF OPHTHALMOLOGY

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ANOMALOUS DUCT OF LACRIMAL GLAND ASSOCIATED WITH OTHER CONGENITAL ANOMALIES.

W. P. LING, M.D.

PEKING, CHINA.

The secretion of the lacrimal gland was discharged thru an opening in the skin, near the temporal extremities of the lids, which did not join to form an external canthus. There were also pedunculated masses in front of the tragus of the right ear and asymmetry of the face. This case is recorded from the Eye Clinic of the Peking Medical College Eye Hospital.

On January 13, 1922, a sixteen year old Chinese boy came to the eye clinic of the Peking Union Medical College Hospital on account of a constant dripping of fluid from a small opening on the skin close to the external canthus of his right eye, which he had since birth. He gave no history of injury or of inflammatory symptoms referred to that region. The fluid caused no irritation of the surrounding skin. He complained of no dry sensation in his eyes nor of imperfect vision. His family and past histories are unimportant.

Examination: The patient is physically underdeveloped for one of his age. His face is noticeably asymmetric, the left side being longer than the right (Fig. 1). In front of his right ear, close to the tragus, he has two pedunculated globular masses about the size of large grapes.

Vision of both eyes is 6/10. When the eyelids of the right eye are drawn

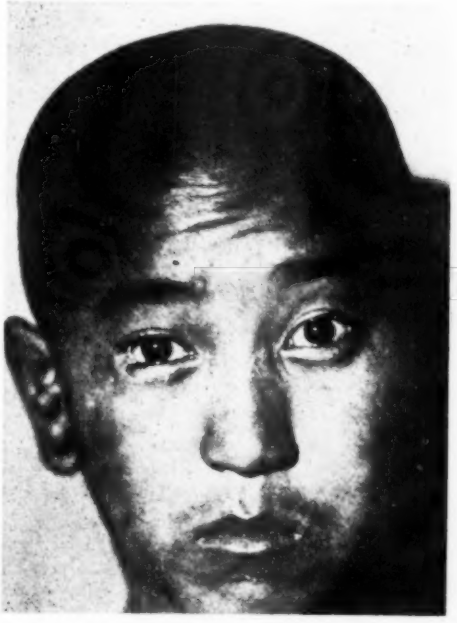

Fig. 1. Chinese boy 16 years old. 1. An anomalous lacrimal duct in skin near right external canthus. 2. Separation of lids at external canthus. 3. Two pedunculated masses in front of tragus of right ear. 4. Left side of face longer than right.

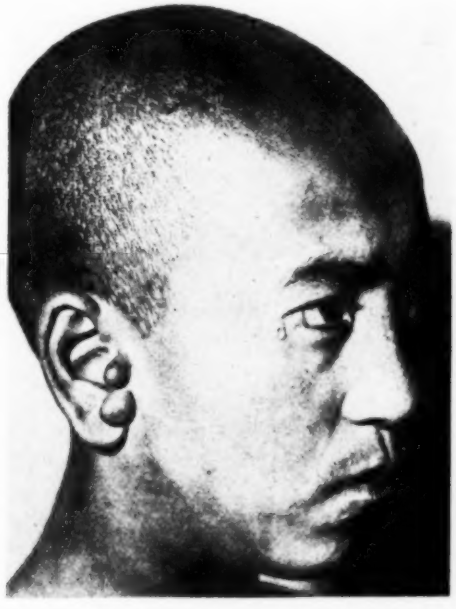

Fig. 2. Side view showing anomalous duct of lacrimal gland with opening in the skin near the external canthus. 2. The separation of the lids at the external canthus. 3. Reflection of the skin into the upper and lower cul-de-sacs.

apart at the region of the external canthus, it is found that their ends do not meet so as to form an acute angle, but instead they are separated from each other by a space of about five millimeters. They merge almost imperceptibly into a semilunar fold of skin which covers the eyeball adjacent to the malformed canthus (Fig. 2). This fold of skin is continuous on one side with the skin of the face, on the other side with the palpebral and bulbar conjunctiva. Its inner edge is curved and concentric with the margin of the cornea. It measures about 12 mm. wide including the parts reflected toward the cul-de-sacs. It merges almost imperceptibly from skin into mucous membrane. From under the fold several large blood vessels are seen running horizontally toward the cornea.

Immediately external to the malformed canthus there is an oblique opening in the skin measuring one millimeter in diameter from which a transparent fluid is dripping (Fig. 2). Pressure on or manipulation of the part causes no pain. Into the opening a small probe can readily be passed upward toward the lacrimal gland for a distance of eight millimeters without producing any bleeding.

There are no other anomalies of the eye. The left eye is normal. The fundi are normal.

A portion of the duct about ten millimeters long was excised under infiltration anesthesia. It was found to be connected with the orbital portion of the lacrimal gland. The wound healed by first intention, and complete cure followed.

Microscopically the duct is seen to be lined by stratified squamous epithelium. Around the lumen there are several hair follicles, sebaceous glands, and a few sweat glands. The framework is composed of connective tissues.

Summary.

This case has four congenital anomalies:

1. An anomalous duct from the lacrimal glands opening in the skin external to the usual site of the external canthus. There is no reference in the literature since 1879 to such an anomaly.
2. Separation of the lids at the external canthus, the space being covered with skin which is reflected as far as the cul-de-sacs.
3. Two pedunculated masses in front of the tragus of the right ear.
4. Asymmetry of the face, the left side being longer than the right.

CONGENITAL DEFECTS OF ABDUCTION AND OTHER OCULAR MOVEMENTS AND THEIR RELATION TO BIRTH INJURIES.

HAROLD GIFFORD, M.D., F.A.C.S.

OMAHA, NEBRASKA.

The etiology of this condition is in dispute. A discussion of it is here given, with special reference to the birth injury theory in its various aspects and relations. The differences between monolateral and bilateral cases are pointed out, with the methods in which heredity might appear in the etiology. A table of 39 cases from the author's practice and a bibliography are given.

The etiology of these defects is still obscure. Kunn published the first comprehensive study of them, under the title Congenital Deficiency of Motility. In a paper read before the 1924 meeting of the American Academy of Ophthalmology and Oto-Laryngology, following the terminology of Duane's classical monograph, I called the condition Congenital Abduction Deficiency, using the abbreviated C.A.D. to fix attention on the most persistent and important single feature, to which retraction and deficient adduction are probably secondary. My main object in writing this paper is to discuss the etiology of the condition, with special reference to the birth injury theory.

MONOLATERAL CASES.

Monolateral and bilateral cases merge to some extent, but many cases of the latter have features which are practically absent from the former. Hence the monolateral cases, which are much more numerous, will be considered separately. The affected eye usually turns in slightly; but in some cases is parallel with the other, or even turns slightly outward when the unaffected eye looks straight ahead. There is generally slight static enophthalmos, but genuine ptosis is very rare. On attempted abduction the eye generally goes to the median line, or a little beyond it, but no farther; and the palpebral fissure usually widens slightly and the eyeball comes slightly forward. Propulsion on looking outward, especially noted by Wolff, was first observed after an operation by Stilling. In the cases of Best and Bergmeister enophthalmos existed without retraction. On looking either up and out or down and out, the eye generally turns a little farther out, than when the attempt is made to turn it straight outward. Adduction is almost always somewhat, and often very much decreased; and in the great majority of cases is accompanied by a distinct narrowing of the palpebral fissure, with retraction of the eyeball. In the German literature these cases are referred to as cases of retraction movements. In perhaps the majority of cases the eye turns up more or less, on extreme adduction, in a few cases going straight up, instead of inward. Upward and downward movements are generally given as normal, tho slight reduction is not uncommon. In quite a number of cases the other eye shows slight deficiency of abduction or adduction; or, even if its range of the motility is normal, extreme lateral movements produce slight nystagmus.

A large majority of the reported cases (about 77%) are leftsided, and about 60% are females. Another feature, apparently not hitherto noticed, is that among the males reported, the predominance of lefts over rights is not nearly so great as among the females.

In many cases, the vision of the affected eye is as good as that of the other; while in a still larger proportion it is not quite so good, but without objective cause for the difference. In a few cases the affected eye is very amblyopic, with a normal fundus or with some retinal lesion. Unless there is a marked visual defect, stereoscopic vision prevails in that part of the field within which the defective lateral muscles permit free motion. Diplopia is rarely complained of. In nearly all cases, however, where the vision is good, it can be demonstrated with the red glass and prism in the outer field of the affected eye. The absence of

marked secondary contracture of the internus is noteworthy. These peculiarities alone would mark off unilateral C.A.D. from the ordinary cases of convergent strabismus.

The anatomic conditions underlying this syndrome have been exposed, to some extent, by operations on both the external and the internal rectus. With very few exceptions, the external rectus has been found to be represented by a fibrous band containing no muscular tissue. The internal rectus has sometimes been found to be attached somewhat farther back than normal, or to have one or more secondary attachments farther back than the primary one. In describing their operations on the internus, the operators usually make no comment on the condition of the muscle itself, the inference being that it has been found to be not especially abnormal. But in some cases the internus was found to be replaced by a fibrous, nonmuscular band, quite like that found in the place of the externus. In others it has been found to be unusually broad and thick; in still others very rigid.

Exceptional variations in the condition of the external rectus have been found. Bahr could find no trace of an external rectus. Axenfeld and Schürenberg found, in place of the external rectus, a somewhat fibrous, but not entirely inelastic band. Green found the externus attached to the sclerotic from the usual point of insertion back to the neighborhood of the equator, from which point two fibrous bands led back into the orbit. Evans found the upper half of the externus muscular in appearance and showing muscle fibers with the microscope. Faradic stimulation produced no effect. Birch-Hirschfeld and Rost each report a case in which both internus and externus were fibrous and inelastic. In case 36 of my own list, a bilateral one, the externi, tho small, looked like ordinary muscles, tho no microscopic examination was made.

Frequency. In 1905, Duane could find, including 6 seen by himself (and 6 bilaterals), only 54 cases of C.A.D. Birch-Hirschfeld, reported only 50 cases. He leaves out Duane's personal cases because some of them showed no retraction. From the literature I have gleaned enough others to bring the cases hitherto reported up to 105 monolaterals and 34 bilaterals. To these I can add 30 monolateral cases (and 9 bilateral ones) all from my own practice. This does not mean that either the size of my practice or my clinical discernment has been anything unusual. Since the early 90's, when I saw my first case, I have been on the lookout for others and such cases are not so uncommon as one would think from the reports. In discussing the subject with men in different parts of the country, I find that a large proportion of them, on hearing the characteristics of the affection, realize that they have seen one or more cases.

Distribution. The most striking feature in the statistics of monolateral C.A.D., is the preponderance of left eyes affected. Of the 135 cases collected by me, including my own 30, 77% were leftsided, and a somewhat similar proportion appears in all the different series of any size, which have been reported. Out of 26 by Evans, 84.3% were lefts. In 14 cases added by Duane, 78.5% were lefts. In my own series of 30, 83.4% were lefts. Hardly less striking is the preponderance of females over males. In the 70 cases comprised in the lists of Evans, Duane and myself, 65.7% were females. In the entire list of 135 monolaterals, 60% were females.

Predonderance of Females. The prevalence of females over males, which has been observed in every large list of cases of C.A.D., seemed to me to be probably the result of the greater attention which is generally paid to the personal appearance of girls and women. In a large proportion of cases of monolateral C.A.D., the deformity is so slight, when the patient looks straight ahead, as to attract little attention; and in greater degrees it is apt to be concealed to some extent by a slight rotation of the head. The consequence is that many of these patients do not report for treatment until they are well grown and, occasionally, the defect at-

tracts so little attention even then, that it is only accidentally discovered by the oculist. With the increasing use of the mirror by boys, this sex difference may tend to disappear from the statistics of C.A.D. The belief in the personal-appearance explanation of preponderance of females in C.A.D., has been expressed by Hoefnagels and others.

Smaller Proportion of Lefts Among Males. This peculiarity is evident in all the lists that I have studied, but so far as I know it has not received special comment. In my combined list of 135 monolaterals, females showed 81.4% of lefts; while the males showed 70.3% of lefts. As I know of no obstetric or anatomic explanation for this difference it seems to me that the cause may be an occupational one. There is probably just as large a proportion of left C.A.D. among males as among females. (The preponderance of lefts is at least 10% more than obstetric statistics would require of the birth-injury theory.) But because the games and occupations of boys are more apt, than those of girls, to call for "sighting" with one eye; and as about two-thirds or more of us are righteyed as well as righthanded, defects of the right eye, among boys, will be discovered more frequently than those of the left.

Displacement of Lower Lid on Retraction. An occasional feature of C.A.D. which has hitherto received no special comment, is a slight protrusion or eversion of the lower lid or lower conjunctiva, on attempted adduction with retraction. This has been noted by Türk, Braunschweig, Inouye, Axenfeld and Schürenberg, and in case 14 of my list. This symptom is probably due to propulsion of the orbital fat as the eye is drawn backward. The restriction of this effect to the lower lid may be due, partly to the greater laxity of the tissues of the upper lid, partly to the fact that in the majority of the cases, where the eye does not move straight in on adduction, the tendency is for it to turn up; thus, while the globe is pulled back, forcing the posterior two-thirds of the globe relatively down and forward.

Explanation of Symptoms. The lack of abduction is generally explained by the anatomic conditions found at most operations. The retraction of the globe and narrowing of the fissure on adduction, has been the subject of the greatest controversy. By perhaps the majority, the rigidity of the external rectus has been held to be sufficient explanation; while others fall back upon an attachment of the internus too far back, or the presence (demonstrated in some cases) of secondary posterior attachments of the tendon; or upon the assumed atavistic development of a retractor bulbi with an attachment near the posterior pole. Peschel, Parker, and others attribute the retraction to the action of the superior and inferior recti in their attempt to supplement the deficiency of adduction. The narrowing of the fissure is held by Sinclair and Duane to be due to an associate action of the orbicularis. Treacher Collins suggests that perhaps, in addition to unusual attachments of the internus, defective ligaments permit an unusual retraction effect from the recti. A similar theory has been advocated by Varese. The slight (relative or positive) exophthalmos on attempted abduction, to which Wolff in particular called attention, is probably due to the combined action of the obliques. The tendency for the eye to turn up and in (or more rarely down and in) on attempted adduction, has been explained by Wolff as an effect of the resistance to retraction offered by the optic nerve, while Duane regards it as evidence of oblique spasm. The pros and cons of these and other theories have been so thoroly thrashed out in the series reports of Axenfeld and Schürenberg, Evans, Duane and Birch-Hirschfeld, Green, Crisp and others, that I shall not attempt to go into them deeply. My main object in writing this paper is to discuss the etiology of the conditions with especial reference to the birth-injury theory. Therefore, I shall give but scant attention to the individual peculiarities of the cases which I have collected from the literature, in addition to those included in the lists above noted, or to those of the

30 unilateral cases from my own practice.

ETIOLOGY.

The chief interest at present centers in the question of etiology, Kunn, who wrote extensively on congenital defects of the eye muscles, considers them the result of aplasia, but whether primarily of the muscle or of the nucleus, he does not like to say. Axenfeld and Schürenberg, Evans, Duane and Birch-Hirschfeld attribute the conditions to peripheral defects of the muscles and their insertions, without anything fundamental as to the reasons why such peripheral defects should occur. Moebius believes they may be examples of intrauterine nuclear degeneration. (Kernschwund). Peters believes the cause to be a defective "anlage" of the muscle. Posey has reported a patient with bilateral abducens paresis born with the cord around the neck and deeply asphyxiated. Intrauterine myositis, orbital cellulitis, and amniotic bands have also been suggested as causes. None of these theories, however, gives any explanation of the remarkable preponderance of left sided cases.

Birth Injuries. There is quite an extensive literature on birth-injuries of the eye (Sidler-Huguenin, Thompson and Buchanan, Hugo Wolff, etc.) from which it is evident that all kinds of eye injuries may occur, as the result of both natural and instrumental deliveries, but most of it has no direct bearing on C.A.D. To illustrate what the processes of parturition, without instrumental aid, can do to the eye, the famous case of Hofmann should suffice. He was called to a woman who had just given birth to a child, and found the infant's right eye hanging out on the cheek, attached only by the inferior rectus and some loose connective tissue. The birth was spontaneous but protracted. Three years later, he was called to the same woman, and on account of delayed birth and failing uterine power, delivered the child with forceps without difficulty. As the head was delivered, the right eye of the babe fell into his hands. It was quite certain that the forceps had played no part in the enucleation of the eye, but the frontal bone was much depressed. As the mother died after a third delivery, a section was made which showed the conjugate diameter to be only 3 inches; the junction of the last lumbar vertebra with the sacrum was not rounded off in the normal manner, but presented a sharp angle.

Several other cases have been reported (De Wecker, Bock, Polliot, Turnbull, Thompson and Buchanan), in which an eye has been found at birth to be enucleated or nearly so, and it has sometimes been assumed that these accidents were produced by the midwife's or operator's fingers; but in view of the neatness with which nature accomplished the enucleation in Hofman's case, it seems as if it might well be unjust to drag in the accoucheur. In 1893, Parent expressed the belief that many congenital eye muscle defects were due to birth-injuries. He says: "As to the etiology of the paralyses which we call congenital, I believe that a certain number of them are due to the traumatism of a laborious birth, with or without forceps." Birch-Hirschfeld, tho in general favoring muscular abnormalities as a cause of C.A.D., admits the possibility of orbital hemorrhage from birth-injury as a cause of "congenital enophthalmus." Praun and Würdemann, in their respective works on Injuries of the Eye, mention birth violence as a possible cause of ocular paralyses.

In the late 90's, the writer, impressed by the preponderance of lefts over rights reached, and taught to his classes, the conclusion that unilateral C.A.D. was probably due to a birth-injury from pressure; but did not give the matter sufficient thought to work out the modus operandi of the process, as has been done by Gallus and Hoefnagels. The former, in 1910, merely expressed the belief that C.A.D. was due to a birth-injury, with scar fixation of the externus; while in 1914, Hoefnagels called attention to the remarkable agreement between the proportion of left and right C.A.D. when compared with the more common birth presentations. He pointed out,

that from the L.O.A. position (in which about 70% of normal births occur) the left temple, in the rotation of the skull, would be forced against the promontory; the result, perchance, being an anemia; which, if long continued, might cause the degeneration of the externus muscle into the fibrous band which is commonly found to take the place of the muscle in these cases. He cites Leser's experiments to show that a pressure anemia of two to three hours produced a myositis, followed by nearly complete regeneration of the muscle cells; while, if the pressure was continued for five to six hours, the greater part of the muscle underwent permanent fibrous degeneration. He also quotes de Vries, who found in normal births, without external signs of injury, 11% with retinal hemorrhages.

Stirred up by Hoefnagels' paper and later by attacks on his theory by Eichmann and Peters, Gallus elaborated his original suggestion, explaining his belief that C.A.D. is due to rupture of the muscle sheath of the externus by intrapartum pressure, with subsequent degeneration of the fibers. Both he and Hoefnagels emphasize their belief that instrumental injuries are not to be looked for as the main cause of C.A.D., but rather relatively normal deliveries; in which, for one reason or another, the outer side of the orbit or eye has been subjected to unusual pressure.

Turning now to the actual evidence of birth injuries in these cases, we find very little that is positive. Bloch has reported three cases of C.A.D., with forceps scars on different portions of the face and head. One of my patients had a well marked forceps scar in the parietal region on the corresponding side. Peters and Gallus, each mentions a similar case. It is by no means certain, however, that in these cases, or in the others in the list, in which forceps were used, damage to the eye was the result of the use of the forceps rather than of the general severity of the pressure to which the head had been subjected, before the forceps were used. In a majority of reports, either nothing is said of the character of the birth, or it has been described as normal. In my own cases, out of 14 in which particulars of the birth were known, it was reported normal in 7; and altho only two patients showed forceps marks, birth was difficult or instrumental in 7, which is certainly a high proportion of difficult birth.

It is evident that if birth-injury is the main cause of C.A.D., it must generally be produced by the natural forces in such a way as to give very little external evidence of the injury. The comments of Dr. Davis (see below) favor this possibility. It should also be remembered, that in the case of Hofmann, where one eye was squeezed out of the orbit, the depression of the frontal bone which Hofmann is sure must have been present, entirely disappeared in the course of an hour. Sidler-Huguenin reports 3 cases of congenital abducens paralysis with prolonged and difficult, but not instrumental births, without mention of external signs of injury. Further evidence of the frequency of internal injuries of orbit or brain, without mention of external signs is given by Scrini who, in 136 new borns, found 60 with alternating convergent strabismus. This tended to disappear altho the final results were not known. It occurred more frequently with primiparae, and in prolonged labor generally, altho in many cases labor was not especially prolonged. In the same line is the testimony of Sharpe, who found 9% of blood tinged spinal fluid in 100 conecutive new borns; and in a second 100, 13%. Several observers have found retinal hemorrhage to be very frequent among otherwise normal new borns.

Obstetric Injuries. Inquires among prominent obstetricians gave mostly negative results. They were willing to concede the probability of injuries to the eye muscles from birth pressure or hemorrhages; but never having had their attention called to C.A.D., they had paid no attention to the comparative frequency of slight injuries to right or left temples, in ordinary births or in the different pre-

sentations. My attempt to subsidize investigation on the part of the internes and nurses, on this point, received no encouragement from the hospital authorities of one of our largest maternities, and produced practically no results. Several obsetricians were kind enough to answer my inquiries at some length. Dr. Wilbur Ward, of the Sloane Maternity in New York, writes that he could see no obstetrical reason, for C.A.D. affecting the left side oftener than the right; and that he had no impression that injuries occurred more often on the left side than on the right.

Dr. J. B. DeLee writes that the direct pressure theory of C.A.D. does not impress him favorably. He thinks it more likely to be the result of hemorrhage in the nerves or ganglia. He does not think the left side of the head is injured more often than the right.

On the other hand, Dr. Edward P. Davis, Philadelphia, writes, "Pressure injuries to the fetal cranium and face are much more common than is usually supposed. Unless bruising or laceration occur, such conditions are commonly not detected. I have seen numerous instances where, after a particularly long and difficult labor, accompanied by birth pressure, some deviation in the eyes subsequently developed. As regards the frequency of this condition in the left eye, in the majority of labors the left side of the face is directed toward the promontory of the sacrum. No pelvis is absolutely normal in contour, and there is no way of knowing in a given case that pressure may not develop in this region. The fact that in the history of the case it is stated that nothing unusual occurred at the time of birth, is of no value whatever. The majority of the obstetric cases are attended in such a loose and careless manner that their histories are worthless."

Such testimony as we have from German obstetricians is more favorable to the birth-injury theory. Gallus quotes Kramer as his mainstay in bringing out the importance of statistics of the different obstetric position in support of the birth-injury theory. Leitzmann (cited by Bloch) has noticed that the occurrence of edema in the temple region of new borns is more common on the left side than on the right. Along the same line is the testimony of Küstner, who, altho he believes that paralysis of the eye muscles from birth injuries are almost always due to hemorrhage at the base of the brain, speaks of the symptom frequently observed in the form of a characteristic pressure furrow, made by the promontory on the infant skull, beginning on the parietal, running down toward the ear, and then forward and downward across the temple to the zygomatic region of the face.

Radiographic Results. In the effort to obtain information as to obstetric lesions of the orbit without any permanent exterior sign, I had orbits radiographed in 9 cases of C.A.D., with negative results, except that in one bilateral case, the outer wall of the left orbit at the lower part tipped inward slightly more on the left side than on the right. The only other radiographic examination of the orbits in C.A.D. that I have noticed is that of Lutz, who found a shadow at the apex of the orbit on the affected side which he thought might indicate a periostitis.

Explanation of Retraction and Adduction Deficiency.

Altho Gallus and Hoefnagels, the main protagonists of the birth-injury theory, have confined their attention to the externus as the seat of injury and have tacitly or avowedly acquiesced in the generally accepted explanation of the retraction and adduction deficiency (i.e. that it is due to the resistance to adduction offered by the fibrous externus), there is a good deal of evidence that pathology of the internus is present in many cases, the extra attachments of the internus to the globe which have been found in cases such as those of Knapp and Bahr, have been regarded as anatomic peculiarities, but it may well be that they were traumatic adhesions. In two cases of Evans, passive adduction (with the aid of forceps) was quite easy while passive abduction beyond the mid line was im-

possible. Extreme resistance to passive abduction was also found in cases of Williams, Birch-Hirschfeld, Rost, Thomas, and Case 36 of my list. In fact, according to my notes, resistance to passive abduction has been reported as often as to passive adduction. Furthermore, in one case of Birch-Hirschfeld, and one of Rost, the internus was found to be just as fibrous and inelastic as the externus; and in the first of these cases the microscope showed an entire lack of muscle fiber in the internus. Clausen's patient showed adhesions to the globe both of the externus and the internus.

Just how frequently such abnormalties of the internus occur cannot be told until a large number of cases have been examined with special reference to this point. From the number already discovered, somewhat accidentally, they probably are relatively common. How shall we account for the occurrence of marked pathology affecting chiefly the externus, and only one, the internus, of the muscles supplied by the third nerve? Obviously not on the supposition of a nuclear or other intracranial lesion; nor upon that of an intrauterine inflammation; nor of a muscular aplasia. The birth-injury theory seems much more satisfactory, for if enough force is brought to bear to cause degeneration of the externus, it is plain that the opposite side of the eye must also have been exposed to severe if somewhat less pressure. If to this we add the possible effects of hemorrhage, it is not difficult to imagine results of birth-injury, which would account not only for the typical defects of abduction and adduction, but for the less frequent defects of other motions. Cases such as those of Eason, Varese and Grimsdale, in which adduction has suffered more than abduction, may perhaps be due to birth-pressure in presence of an unusually prominent inner orbital wall; or to a blood supply favoring hemorrhage at the inner side of the orbit.

Abduction Deficiency from Rigid Interni. Writers on C.A.D. are apt to assume that the abduction deficiency is always due to a defective externus, but the cases in which passive adduction is easy, and passive abduction difficult or impossible, strongly indicate that the condition of the internus may play a large part in the defective abduction. In fact, if it were not for the general lack of retraction on attempted abduction, and the frequent finding of defective externi at operations, one might think that the externus was all right in such cases. As it is, we feel that the externus must be defective in a large proportion and perhaps in all cases. But it will take a long series of observations on the passive mobility, before we can judge how often either the retraction, the abduction deficiency, or the adduction deficiency is due entirely to a defective and rigid externus; and how often it is the result of internus pathology, or possibly of adhesions to the orbital wall.

Adhesions to the Orbital Wall.

In the abstract of Gallus' original remarks on C.A.D., reference is made to birth injury "with scar fixation," as if he meant fixation to the outer wall. In his later communications this idea seems to have been dropped for the more prevalent explanation of retraction as a result of a resistance to adduction from a rigid externus. If C.A.D. is the result of birth-injury, cases with adhesions to the orbital wall would naturally be expected. Nothing of the sort has been reported as the result of operative exploration; but it is quite possible that it might have been present in some of the cases, at a part of the muscle not exposed at the operation. Such an adhesion might explain lack of abduction, diminished adduction, retraction and eventual defects of other motions. Such an adhesion at the inner side of the orbit would explain such a case as that of Lauber, where C.A.D. was accompanied by retraction on abduction. This possibility is well illustrated by the production of retraction by attempted motion in any direction with forceps fixation at the opposite side, as shown by Türk; and by another case of Lauber's where syphilitic fixation to the inner wall caused retraction on abduction. The case of Dibbelt

also showed that traumatic fixation of the internus to the globe could produce abduction retraction. In case 36 in my own list, such obstinate resistance to passive abduction was shown, even after tenotomy of the internus, that a fixation to the orbital wall seems to offer the most plausible explanation.

Condition of Muscles. Cases of incomplete degeneration of the muscles like one of Axenfeld and Schürenberg and one of Evans, would at first thought seem to fall in more easily with the birth-injury theory than with any other. In the former, the externus appeared fibrous but was not inelastic, while in Evans' patient, the upper half of the externus seemed less fibrous than the lower half, and muscle fibers, staining imperfectly, were found with the microscope. This was the eye in which passive adduction was easy, but passive abduction impossible. In one of Axenfeld and Schürenberg's cases, with retraction on adduction, passive adduction was so good that they believe a retractor must have been present; in another, both passive adduction and abduction were good, the former not quite so good. Considering that most of the cases of C.A.D. in which the *internus* has seemed rigid, show quite a little adductive power (and a certain amount of abduction in some cases), it is highly probable that such partial degenerations of the muscles are the rule rather than the exception. Because most of the men who have operated for C.A.D. report the externus as fibrous, it does not follow, that, in these cases, the whole muscle was fibrous; the greater part of it may have been normal. That the degeneration noted in the anterior part of a muscle may not extend to the posterior part is indicated by the fact that, in some eyes with considerable power of adduction, the internus, so far as it was exposed, was fibrous and devoid of muscle fibers. The electric reaction of the exposed muscle seems to have been tried only by Evans; and altho he found it negative. it is quite possible that if the electrode could have been applied farther back a different result would have been obtained.

It must be admitted, however, that the results of Heubner's postmortem (see below) strongly indicate that partial deficiency of the muscle instead of being the result of birth trauma may be explained as well or better on the theory of nuclear aplasia. In his case it is evident that the aplasia of a nucleus could be partial or complete, and altho the eye muscles appear not to have been examined at the section, the condition of the defective tongue indicated that the defect of the nucleus was paralleled by that of the muscle. On the other hand, inasmuch as there was no evidence of a degeneration or transformation of the muscle, but merely an entire absence of the fibers corresponding to the missing portion of the nucleus, we should expect, if C.A.D. were generally the result of defective nuclei, to find an entire absence of all (as in Bahr's case) or a part of the muscle, rather than the fibrous band which has been found in nearly all the operations on the externus.

The quality of the muscle change in C.A.D., has been a subject of dispute between Peters and Gallus; the latter contending that the tissue found in the degenerated externus is entirely different from that found after destruction of the nucleus. Several cases are included in this list in which the statement is made that the condition was not noted for some months or years after birth. I have not thrown these out where the symptoms were typical, because it is so easy to overlook slight C. A. D. in infancy or childhood. The cases where the condition has been noted after, and attributed to some intercurrent disease, are probably to be explained by the greater attention to the child's appearance which parents give after such a disease.

Birth Injuries to Interior of Eye. Peters holds it to be inconceivable for the muscle to be thus injured without serious injury to the eyeball. To this it may be remarked that while the coats of the eye are somewhat readily injured by a sharp blow, a slow steady pressure is much better borne. In none of the several cases of enucleation by birth pressure has any sign of injury

to the globe been noticed; and in the only one in which I have noted an examination of the interior (Thompson and Buchanan), nothing abnormal was observed, macroscopically. Moreover, a few of the affected eyes have shown fundus changes with the ophthalmoscope; and the fact that, in spite of the presence of binocular vision in part of the field. the vision of the affected eye is very often somewhat less than that of the other, indicates that slight intraocular lesions, from pressure, may not be uncommon.

Change in Conditions. Cases where the condition has become better (Knapp, author's case 2), or worse (Williams, Best, Snowball) after birth, are more easily explained on the birth-injury theory than on that of aplasia.

Heredity. Heredity seems to play no part in the great majority of cases. In my own list, I have a mother with typical left C.A.D., one of whose children, a son, has bilateral C.A.D., and a similar case is reported by Harlan. Kraus reports a mother with monolateral C.A.D., whose son was also affected in the same way. Endelmann also reports a mother and daughter with left C.A.D.; and Varese's patient (male) had a mother said to be affected in the same way. An instance in which more than one child in the same family was affected is the family of Kunn-Wolff, in which two sisters and a younger brother had left C.A.D. These cases do not necessarily speak against the birth injury theory, for even cases in two generations may denote, not a tendency to aplasia of the externus or its nucleus, but the existence of an inherited form of pelvis, or of uterine action.

The case of Hofmann, already referred to, in which two successive children were born with the right eye pushed out of the orbit, showed both how birth injuries may occur in more than one member of a childship; and also, inasmuch as the woman had had two other children who were not affected in the same way, that there is no necessity for all the members of the same childship to be affected in the same way by such a pelvic deformity.

A more serious objection to the birth-injury theory is presented by cases in which C.A.D. has apparently been transmitted by the father. Günsberg reports a family in which a mother and son had left C.A.D. Of the son's children, two had normal eyes, while of the other three (all girls), one had alternating strabismus with uneven pupils, another had typical left C.A.D., and the third had bilateral C.A.D. In the case of Best's girl, the father's mother was said to have had the same sort of eyes. Waardenburg reports a family with seven living children. The father and the second, fifth and seventh child, all had left C.A.D.

It must be admitted that such cases create quite a strain on one's belief in the birth-injury theory. It has, however, occurred to me that injury to the externus would be favored by an unusually large head. This might be the responsible factor of transmission in these rare cases. Unless I misunderstand Gallus, this is the explanation which he would offer of transmission thru the father. Lest the idea may seem entirely forced, I cite from Bloch: In the family of one of his patients with C.A.D. all four births were unusually difficult, and in one of them at least, this was due to specially large and unusually shaped head.

Other Explanations of Preponderance of Lefts. The backbone of the birth-injury theory is the great preponderance of lefts, and the fact that in the most common presentation the left side is most exposed to pressure. The question may be raised in attempting to account for C.A.D. on some other theory, whether the left abducens is not especially subject to intracranial disturbance which would lead to its atrophy, or degeneration. That the 6th nerve is especially subject to such influence, in other than congenital paralysis, seems to be fairly well established. Its relation to the foramen of Dorello, at the apex of the petrous bone, makes it specially liable to be affected by various forms of intracranial pressure, or by meningitis transmitted from the middle ear. Blows on the head also affect the 6th

very commonly. In the statistics of lethargic encephalitis, it seems to be affected more often than any other nerve; but any evidence to show that the left 6th suffers in anything like the preponderance in which the left externus muscle suffers in C.A.D. is wanting. In a case of entire absence of one 6th nerve, discovered by Pusey in the dissecting room, the right side was the affected one.

More striking is a personal communication made to me by Professor Poynter, Dean of the Anatomical Department of the University of Nebraska. In investigating the effect of temperature on chick embryos, he found that where the eggs were incubated for six hours, then put into the icebox for two hours, then incubated as usual, he got about 60% of undeveloped eyes; and of this 60%, 95% were lefts. It is a far cry from a chick to a child, but if anything like such a one-sided result could be obtained by prenatal noxae in mammals, the rating of the birth-injury theory would certainly decline.

Intracranial Birth Injury. In the absence of any knowledge of problems connected with C.A.D., most obstetricians who have given the matter of congenital eye muscle paralyses any thought, favor the idea that the latter are due to intracranial hemorrhage. The difficulty with this intracranial hemorrhage theory is that it offers no explanation of the remarkable picking out of the external rectus with injuries or peculiarities of the internus, while muscles supplied by other branches of the 3rd nerve are little or not at all affected. The same is true of such suppositions as that of Banister, who belives that in the presence of traumatic edema of the brain the 3rd and 6th nerves might be constricted by branches of the cerebral arteries; or that of Will Walter, who suggests that C.A.D. may be the result of pressure from bone displacement at the apex of the petrosal bone.

Treatment. The writer has in one case secured an appreciable improvement in the static overconvergence by an advancement and tenotomy; but as there is always danger that, by a tenotomy, one may seriously interfere with comfort in the use of the eyes for close work; while if the static squint is cured by shortening or advancing the external rectus, the tendency to retraction of the ball on adduction will probably be increased, the advice given by most writers, not to operate on these cases, is in general good. On the other hand, where the deformity is marked, the range of binocular vision small, and the patient insists on taking the risk of some discomfort in the use of the eyes for the sake of improvement in the general appearance, operative interference may well be justifiable.

BILATERAL CASES.

Individual bilateral cases have been described with great detail, but they have not received the attention which they deserve, in considering the etiology of C.A.D. In fact, they have received no special consideration from the etiologic standpoint, even by Gallus and Hoefnagels.

The bilateral cases are not so well defined a group as the monolaterals. Some of them show, in each eye, a typical picture of unilateral C.A.D., with absence of abduction power and more or less limitation of adduction, together with retraction movements and free vertical movements. Many of them, however, show a tendency toward restricted mobility in all directions, up to the point of nearly complete immobility. Static convergence is more marked than in the unilaterals. Enophthalmos may be just as frequent; but it is seldom noted because the two eyes look about the same. Several of these bilaterals showed no adduction except on convergence. Many of them also show more or less, and often complete, involvement of one or both facial nerves. They also show a strong tendency to be complicated with other congenital defects, such as deformed ears, defective or missing hands, fingers or feet; or defects in the muscles of the chest or neck. They are not so numerous as the unilateral cases. I have collected 43 cases, including nine of my own, having

omitted several on the borderline of complete external ophthalmoplegia.

That these cases of complete, or nearly complete, external ophthalmoplegia, are related to bilateral C.A.D. is indicated by the fact that they tend to be complicated with facial paralysis, and with the sort of bodily deformities that occur in many cases of double C.A.D. (See Collin and Lennon.) That these cases are of central origin is suggested by the paralysis of the left hypoglossal in Collin's patient which also occurred in the case of Heubner, where the postmortem showed marked hypoplasia of various nuclei. Another side chain of this group is pointed out by such cases as one of Lennon's and one of Bernhardt's in which, with normal eye muscles, facial paralysis and bodily deformities occurred. The proportions of the sexes represented in this group are in marked contrast to those in the monolateral group. For instance, of the 43 bilateral cases, 23 were males and 20 were females, as opposed to 54 males and 81 females among the monolaterals.

This contrast may be partially explained on the personal appearance theory; according to which, where the deformity is slight, as in most unilateral cases, the girls are more apt to be reported than the boys; but where the deformity is very marked as it is in all of these bilateral cases, the boys would be reported as promptly as the girls. On the other hand, there is a remarkable agreement with the monolateral group in the proportion of bilateral cases in which the left side was the more strongly affected. In 19 bilateral cases in which I have noted a difference between the sides, 14 or about 73% showed more disturbance on the left side. Of these 14, one-half were males. Of the 5 in which the right side was more affected, 3 were males.

It should be noted that among 43 bilaterals, 15, or about 33%, were complicated with facial paralysis as opposed to 3 out of 135 monolaterals. This facial paralysis was bilateral in 10, monolateral in 5; in 3 of these 5, the left side was affected. Of the 10 bilaterals, one was affected worse on the right, 3 on the left side. Inasmuch as facial paralysis has been reported as a birth-injury sequence, with little or no external sign of trauma, (Grone, Vogel) it might be so considered in these cases; but in view of the close connection between the nuclei of the 6th and 7th nerves, it must be admitted that this complication speaks strongly, tho not decisively, for a central lesion of these double defects. This probability is further increased by the results of the postmortem of Heubner. Heubner rejects the case of Bernhardt (cited by Kunn as evidence of aplasia of the muscles, with normal nuclei) because the examination of the nuclei was not careful enough and no aplasia of the muscles was demonstrated. (The case of Heuck in which a postmortem was made, should not, in the opinion of Duane, be classed under C.A.D. In this opinion I entirely agree, as the subject had an affection of a distinctly family type, different in its main characteristics from C.A.D. These cases are bilateral with marked ptosis and with absolute resistance to any efforts active or passive, to moving the eyes upward. Axenfeld-Schürenberg have reported a case of this kind. I have seen one family of the sort and one has been reported by Lawford.) In Heubner's case, the examination of the 19 months old boy showed complete bilateral lack of abduction with fairly good motility in other directions; no mention of retraction; each fundus normal; vision apparently normal; pupils reacted to light. Complete paralysis of both branches of left facial; the same of the upper branch only, of the right facial; atrophy of the left half of the tongue; no tears on crying. Noteworthy is the fact that altho there was no voluntary motion in the region supplied by the right upper 7th, the muscles of this region responded to the electric current; while on the left side electricity produced no reaction in either upper or lower distribution of the 7th or in the tongue. No reaction was obtained from the unexposed eye muscles of either side. The postmortem showed marked defects in the motor ganglia and nerve fibers of the medulla and the pons

particularly in the nuclei of the facial, the hypoglossus and the abducens. Of the latter practically no cells were present on either side; while of the others the defect was more marked on the left side. The defects seemed to be due to hypoplasia or simple lack of development (i. e. no signs of degeneration or inflammation), as opposed to Moebius' theory of an intrauterine nuclear dis-

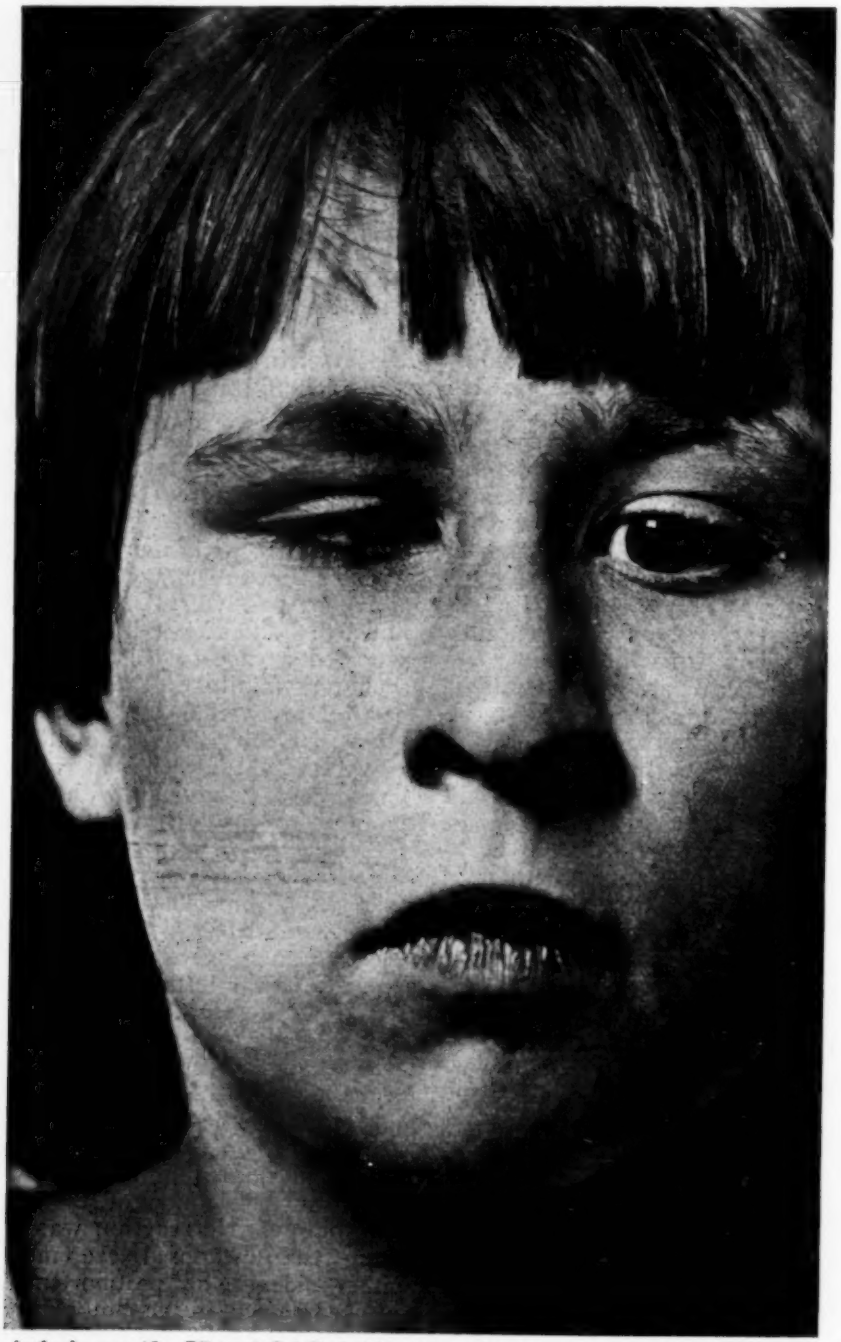

Fig. 1. Author's case 15. Bilateral C.A.D. looking left. The appearance on abduction is precisely that of left C.A.D. on looking left.

ease (Kernschwund). Only a few muscle fibers were found in the left side of the tongue but these seemed normal, with no signs of inflamed or degenerated fibers. The eye muscles seem not to have been examined.

It should be noted in opposition to a division between monolaterals and bilaterals, that in many of the former, slight defects in motility are observed in the second eye; which in several cases has been so marked as to place

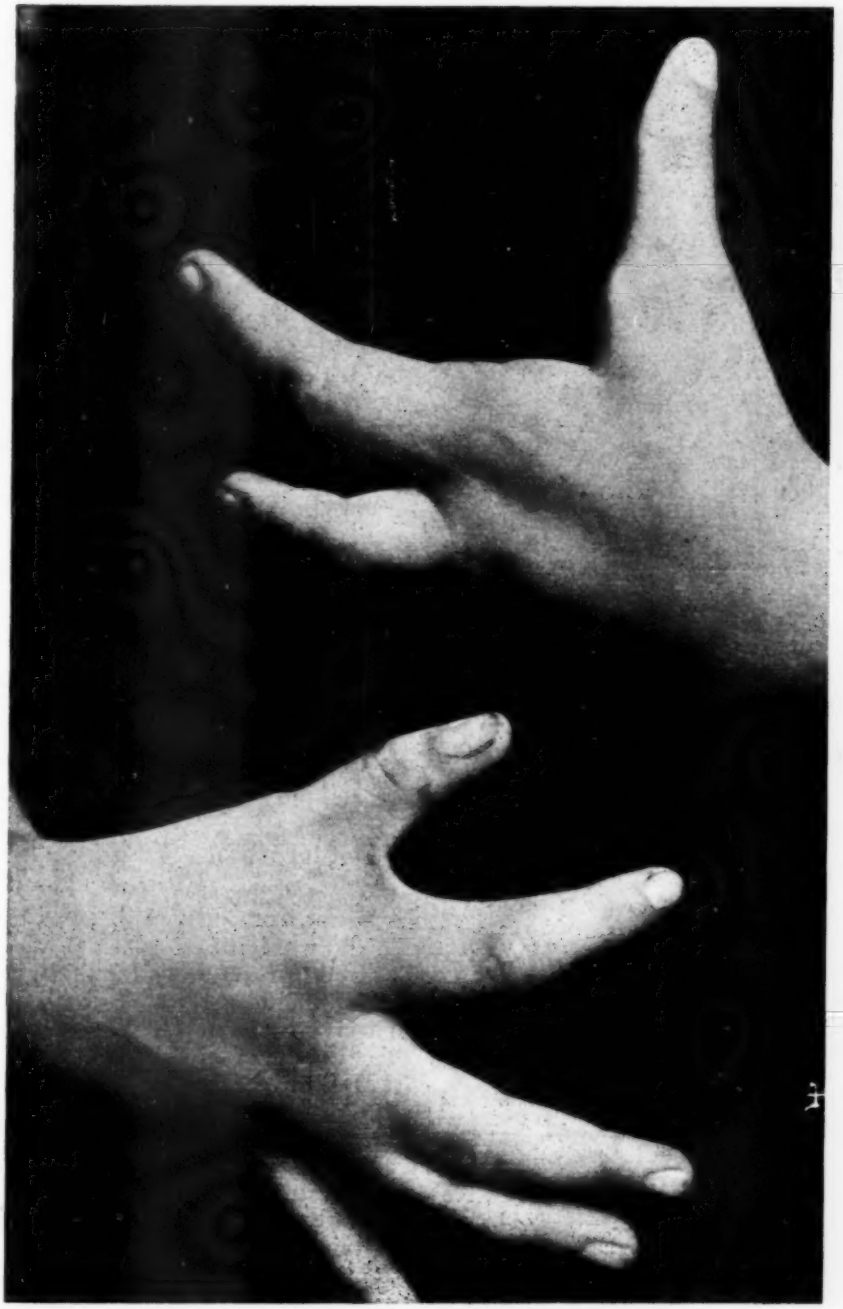

Fig. 2. Same case showing congenital deformity of hands.

them on the border line. Moreover, among the bilaterals, there is probably a majority in which one side was decidedly worse. In hereditary cases, also, the lines between these groups tend to become confused. Three out of seven of these hereditary families showed a mixture of monolateral and

Fig. 3. Author's case 38. Bilateral C.A.D. showing facial paralysis with large flat ears. The patient also has defects of the muscles of the neck on the right side.

bilateral cases in the same family. On the other hand, again, the fact that of the 135 monolateral cases, only 3 (Salomonsohn, Murray, Author's Case 18) were complicated with facial paralysis, speaks for a division between the groups. Of the other bodily deformities (mentioned above), so common in the bilateral group, I have no note among the monolaterals.

CONCLUSIONS.

Many of the features of C.A.D. suggest a peripheral origin; and while it can not be said that a birth-injury has been found to be the cause of C.A.D. in any case, and birth-injury has been noted only exceptionally in the reported cases, there can be little doubt that the processes of parturition might cause the conditions found in C.A.D. with so little external evidence of injury that it would not be noted in the history. Among the monolaterals, the proportion of lefts to rights suggests an obstetric etiology, altho the excess of lefts is considerably greater than that of the L.O.A. position over other presentations. The bilateral cases are so frequently complicated by facial paralysis and other bodily deformities that the birth-injury theory can hardly apply to all of them; and altho the clinical examination of the eyes in Heubner's case was incomplete and the eye muscles do not seem to have been examined at the postmortem, there can be little doubt that the case was a fairly typical one of bilateral C.A.D. with extensive hypoplasia of the nuclei of the 6th, 7th and some other nerves. I have no note of a postmortem in monolateral C.A.D. and the extreme rareness of facial paralysis and other bodily deformities in the monolateral form suggests a different etiology from that which obtains in some at least of the bilateral group. On the other hand many of the monolateral group show some affection of the second eye, and in 7 of the families with hereditary C.A.D., both bilaterals and monolaterals occur. In short, some bilateral cases almost certainly are not of birth-injury origin, and while it is quite possible that a large proportion of the monolaterals have such an origin, it has not been proved in any case.

The study of cases which may be observed in the future should, where possible, include: (1) Careful testing of passive rotation, to help determine the frequency of the internus pathology; (2) The macro- and microscopic examination of both external and internal muscles, both in the anterior part and as far back as possible; (3) Follow-thru observations on the eyes of new borns are highly desirable tho very hard to obtain. In examining the eyes of infants and young children for C.A.D., the ordinary methods of investigation frequently give unsatisfactory or mis-

leading results. In at least three cases where I have thought that a young child had C.A.D., in the course of a few years it became evident that no C.A.D. was present. To meet this difficulty, the suggestion of Dr. Ellett (Amer. Jour. of Ophth., Jan. 1925, p. 81) of Memphis, should be kept in mind. He proposes that in such cases, the caloric test of the semicircular canals should be tried. I have tried it in one case and found it necessary to use a general anesthetic in order to observe the eyes carefully; also that the anethesia must be very light, as otherwise the reflex may be abolished. Experimentally, it would seem worth while to note the effects of pressure on the eye muscles of young animals and on the internal structures; also the effects of injury to the nuclei and nerves on the corresponding eye muscles.

ADDENDUM.

It will be noticed that while the foregoing reports one postmortem which shows that bilateral C.A.D. may be produced by nuclear aplasia or degeneration, there is no proof that monolateral C.A.D. can be produced without the (suppositious) birth injury. I now can add another case which shows conclusively that monolateral C.A.D. can also be produced independently of undue birth pressure.

A boy of 9 years was brought to me August 21, 1925, an account of something peculiar about the left eye which had existed since infancy. I found him to have a typical case of monolateral leftsided C.A.D. The right eye was normal with normal motility and vision. The left eye had normal vision and the fundus was normal. On the attempt to look to the left, the left eye moved outward about ten degrees but no further; the palpebral fissure widening slightly when the attempt at further abduction was made. On looking to the right, the left eye moved inward nearly to the normal extent but there was a distinct retraction of the eyeball with slight narrowing of the fissure.

The history showed that the child had been delivered by Caesarean section performed by Dr. F. J. Schleier of this city, who informs me that the operation was done at the very onset of eclamptic convulsions, before any progress toward birth had been made. The head showed absolutely no sign of injury.

AUTHOR'S CASES.

MONOLATERALS.

1. M. 21 yrs., left C. A. D. No retraction noted.
2. F. 7 yrs., left C. A. D. Good adduction, no perceptible retraction or narrowing. Marked con. strabismus at birth, gradually getting less till about straight at 6th year. Birth dry and difficult; forceps used.
3. F. 16 yrs., right C. A. D. No retraction noted.
4. F. 22 yrs., left C. A. D. No widening of fissure on looking out.
5. M. 28 yrs., left C. A. D. Slight deficiency of adduction both eyes. In ordinary use with both eyes open, L. E. turns 1½ line out. On using L. E. alone it can be moved only 1 line further out. Says L. E. formerly turned in a little but he overcame this by practising turning it out. Birth normal.
6. F. 49 yrs., left C. A. D. Son has bilateral C. A. D.
7. M. 24 yrs., left C. A. D. L. E. goes out to mid line only. Says mother told him his head injured at birth but is not sure forceps were used. Has depressed scar from near left front end of superior fontanelle to near upper attachment of left auricle.
8. F. 19 yrs., left C. A. D. Has always noticed diplopia to the left but is not bothered by it. Mother says nothing unusual at birth Baby very small weighing about 4 lbs.
9. F. 12 yrs., left C. A. D. Birth difficult. Forceps used.
10. F. 45 yrs., left C. A. D. R. E. slight deficiency of lateral movements with nystagmus on extreme abduction or adduction. Left side of face fuller than right, but left temporal fossa deeper than right.
11. F. 17 yrs., left C. A. D. Mother first noticed defect at seventh year, but symptoms so perfectly typical that it is included.
12. M. 50 yrs., left C. A. D. Radiograph shows left orbit slightly wider at the bottom, than right orbit.

13. F. 10 yrs., right C. A. D. L. E. movements normal but on adduction, fissure narrows perceptibly; though not half as much as right fissure does when right eye is adducted.
14. M. 21 yrs., right C. A. D. On adduction right eye is retracted at inner side of fissure and lower lid slightly but plainly everted. Vision, right eye 20/100; left eye 20/15.
15. F. 27 yrs., left C. A. D. Adduction good, no retraction noted.
16. M. 9 yrs., left C. A. D. Perfectly typical except that left eye, which has slightly deficient adduction, shows no retraction on adduction.
17. M. 22 yrs., left C. A. D. Examined by Dr. Patton. Retraction not noted. Radiograph of orbits negative.
18. M. 21 yrs., right C. A. D. Left eye, motility slightly reduced upward, otherwise normal but shows nystagmus on abduction. Never could whistle. Right corner of mouth higher than left. Right side of face fuller than left. Radiograph shows outer wall of left orbit dips slightly inward.
19. F. 23 yrs., left C. A. D. External rectus found to be very small and fibrous. Birth normal.
20. M. 27 yrs., left C. A. D. Retraction on adduction, both eyes; more so left. Right eye shows nystagmus on extreme abduction. Radiograph of orbits negative.
21. F. 9 yrs., left C. A. D.
22. M. 21 yrs., left C. A. D.
23. F. 5 yrs., left C. A. D.
24. F. 5 yrs., left C. A. D., atypical. Left eye has turned in since birth. Now has left strabismus convergens three lines and up one line. On looking left L. E. generally goes to mid line and stops; but by persistent effort can be made to go two lines beyond center. Habitually holds left eye a little wider open than right. Left fissure widens a little more on looking left. Does not narrow on looking right. Right fissure narrows a little on looking left. Right eye, vision = 20/20; left eye, vision = fingers at 1 ft(?) Ophthal. left eye large spot of atrophy and displaced pigment near center of retina. Three years later, left eye, vision = 20/70!
25. F. 34 yrs., left C. A. D.
26. F. 19 yrs., left C. A. D. Radiograph of orbits negative.
27. F. 27 yrs., left C. A. D. Slight retraction each eye on adduction. Right eye normal except for slight retraction on adduction and nystagmus on extreme abduction.
28. F. 7 yrs., left C. A. D. Birth normal.
29. F. 42 yrs., right C. A. D. Left eye motility about normal but nystagmus appears on looking far inward, upward, or outward.
30. M. 15 yrs., left C. A. D. Retraction not noted.
31. M. 9 yrs., left C. A. D. Looking to the left, palpebral fissure widened. Looking to the right retraction of the eyeball. Slight narrowing of the fissure.

BILATERALS.

32. M. 10 yrs., bilateral C. A. D., hereditary. With eyes at rest, right eye turns in one line. Left eye turns in three lines. From this position each eye can be moved outward only one line. Other movements about normal. Each eye shows slight retraction on adduction. Vision normal each eye. Mother has left C. A. D. Radiographs of orbit negative.
33. F. 7 yrs., bilateral C. A. D. Vision and ophthal. normal. Deformed hands. Middle and ring fingers joined right hand. Left hand lacks two fingers. Thumbs deformed. Static strabismus one to two lines, alternating. Neither eye can be turned out quite to mid line. Other motions good. Retraction on adduction Has only slight hyperopia. Birth difficult. Forceps used. Marks of these in temporal region at birth. Three other children all with difficult births but eyes normal. Radiographs of orbits normal. Mother feels sure that eyes were normal till child had fever with semicoma for 5 weeks at six months of age, followed by "sore eyes" for 3 months, during which eyes kept closed much of the time. After this eyes were noticed to be crossed but not so badly as they were somewhat later. Strabismus has been getting better up to seventh year. Photo at 3 months shows eyes straight or nearly so, but position of head such that this cannot be told positively. Is probably bilateral C. A. D. with static convergence increased by conditions of illness. Included in these statistics.
34. M. 1½ yrs., bilateral C. A. D. Right eye turns in three lines and at times up two lines. Left eye turns in one line. Neither eye can be moved out to mid line. Slight enophthalmos right eye. Birth hard, forceps used. Small mark of forceps on back of head visible at birth. Nothing abnormal seen in fundus.

35. F. 12 yrs., bilateral C. A. D. Head can be turned only 10° to 15° to either side. Sternocleidomastoids and trapezius muscles get very rigid on these attempts. Birth very difficult. Version performed. Head deformed at birth, right parietal more prominent than left. This is still the case. Radiograph of orbits normal.
36. M. 68 yrs., bilateral C. A. D. Slight ptosis left eye.
37. M. 11 yrs., bilateral C. A. D. with alternating convergent strabismus of 3-4 lines, worse left. Abduction to mid line right; not quite to middle, left. When eyes are at rest the fissure of the nonfixing eye is slightly narrower than that of the other, but on further adduction there is no retraction; on the contrary the fissure gets perceptibly wider. Neither eye can be moved outward with forceps more than 1-2 millimeters beyond mid line. Even after internal tendon is cut, it is difficult to turn eyes outward with forceps much beyond mid line. External rectus each side looks like muscle tissue but may be smaller than normal. No microscopic examination.
38. F. 6 yrs., bilateral C. A. D. Birth difficult; forceps used. Radiograph of orbits negative.
39. M. 13 yrs., bilateral C. A. D., with bilat. facial paral., worse right. Asymmetric face; large flat ears; epicanthus; defective sternomastoid and scapular muscles, right side; R. E. amblyopic, fundus normal.
40. F. 12 yrs., has bilateral C. A. D. with alternating strabismus conv., (mostly left) of 3 lines since birth. Each eye can be moved outward only a little beyond mid line. Moderate retraction each eye on adduction.

Brandeis Theatre Building

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In the following list, the cases from Jahresberichte or other Annual Reports, are of course, from abstracts; all others, unless otherwise stated, are from the originals. C. A. D. denotes that the case has the main characteristics of Congenital Abduction Deficiency, i. e., Abduction absent or markedly below normal; and with rare exceptions, slight enophthalmos and some retraction on adduction, with more or less deficiency of the latter.

Alling. Tenotomy of int. rectus; tendon very broad and thick. Ext. rectus only fibrous tissue. Also one other case, l. f., reported in Duane's article. Arch. of Oph., 1900, p. 310. C. A. D. l. f.

Axenfeld and Schürenberg. Four cases C. A. D. 1, l. m. 2, 3, and 4, l. f. The 1st case is not included by A. with the others on account of lack of retraction. Kl. M. f. Aug., 1901, v. II. p. 844.

Babonneix and Harvier. Bilateral C. A. D. f. with left facial paralysis. Gaz. des Hôp., 1908, p. 1515.

Bahr. C. A. D. l. m. No abduction; slight adduction with marked retraction. At operation, no externus found. Internus attached 12 mm. from cornea with another attachment still further back. Jahresbericht f. Oph., 1896, p. 405.

Bergmeister. Beit. z. Aug., 1902, v. V, p. 901.

Bernhardt. Berlin. klin. Woch., 1899, No. 31.

Best. Unusual case of C. A. D. l. f. Much static enophthalmos; got worse with increasing growth. Grandmother on father's side said to have an eye of the same sort. Deutsch. med. Woch., 1903, Vereins-Beilage, No. 50, p. 393.

Bietti. C. A. D. l. f. Cited by Peschel.

Birch-Hirschfeld. General review including 2 personal cases. 1st C. A. D. l. f. 2nd Bilat. C. A. D. m. Worse right. Both int. and ext. recti of R. E. found to be inelastic and tendinous. Regards C. A. D. in general to be due to muscular anomalies. Perhaps in some cases to intraocular hemorrhage at birth or intrauterine orbital inflammation. Graefe-Saemisch. 2d Ed. Krankh. d. Orbita, p. 219.

Blatt. C. A. D. l. m. Some unusual peculiarities of inward motion. General discussion. Kl. M. f. Aug., March-April, 1924.

Bloch. Three cases of C. A. D. 2 monolat. left, 1 bilat. worse right; all males. Reported as results of forceps delivery; descriptions brief; nothing said of retraction or adduction. Not included in these or other statistics of C. A. D., but probably should be. Cb. f. pr. Aug., 1891, p. 134.

Bock. Cb. f. pr. Aug., Jan., 1902.

Braunschweig. C. A. D. r. m. Motion restricted in all directions, especially outward. (No abduction.) Eversion of lower lid on adduction. Oph. Klinik, 1898, p. 65.

Brown, S. H. C. A. D. l. f. Ann. of Oph., 1910, p. 464.

Cabannes. Bilat. C. A. D. f. Worse left; left facial paralysis. Jahresbericht f. Oph., 1900, p. 443.

Carpenter. C. A. D. l. f. Oph. Record, 1905, p. 99.

Chisholm. Bilat. C. A. D. f. bilat. facial paralysis. Arch. f. Aug., 1887, x. XVII, p. 414.

Clausen. C. A. D. r. f. Operation showed adhesions to globe of both int. and ext. rectus. Kl. M. f. Aug., April-May, 1922.

Coburn. C. A. D. l. f. Birth difficult. Static divergence. Had been operated twice. Cited by Green, 2nd, p. 364.

Collin. Cb. f. pr., Aug., 1909, p. 208.

Collins. C. A. D. l. m., with enophthalmos and retraction on adduction. Brit. Med. Journ., 1899, v. II, p. 846. Case VI.

Crisp. 1. C. A. D. r. f. other motions normal, no retraction mentioned. Globe flattened at site of r. ext. rectus attachment. 2. C. A. D. l. m. no retraction mentioned. Good discussion of subject, especially for other congenital defects and theory. Am. Journ. of Oph., 1918, p. 172.

de Schweinitz. C. A. D. r. m. Cited by Duane.

DeWecker. Ann. d'Oculist., July, 1896, p. 40.

Dibbelt. Inaug. Diss. Greifswald, 1905.

Duane. Extensive list; full discussion of C. A. D. with 6 personal cases, of these 3 were l. f.; 1, r. f.; 1, r. m.; 1, l. m. Arch. of Oph., 1905, p. 133.

Eason. Tr. Oph. Soc. Un. Kgd., 1903, p. 269.

Eaton. C. A. D. l. f. Reported as paralysis of internus and externus. Bull. San Francisco Polyclinic, Dec., 1900, p. 30.

Eichmann. Cited by Peters.

Ellett. Amer. Jour. of Ophth., Jan., 1925, p. 81.

Endelman. Two cases of left C. A. D.; mother and daughter. Abst. in Zeit. f. Aug., July, 1911, p. 75.

Evans. Up to date list with good discussion of C. A. D. Two personal cases; 1, l. f.; 1 bilat. m., worse l. In each patient the left eye could, with forceps, be rotated inward easily, but not outward beyond mid line. Oph. Rev., 1903, p. 1.

Feilchenfeld. C. A. D. l. f. K. M. f. Aug., 1896, p. 127.

Freytag. C. A. D. l. m. Arch. f. Aug., Lit. Rept. for 1921, p. 133.

Friedenwald. Cases 13, 14 and 20, are C. A. D. l. f., l. f. and r. f., respectively. Case 22 is bilat. C. A. D. m. Two other cases (21, 23) are probably C. A. D., but not counted as such because attributed to postnatal injury. Johns Hopkins Bull., 1896, p. 134.

Fryer. Bilat. C. A. D. m. Double facial paralysis, one hand missing with other bodily defects. Ann. of Oph. and. Otol., 1892, p. 82.

Galezowski. C. A. D. l. f. Recueil d'Oph., 1909, Mars. Tr. Soc. Oph. de Paris, p. 42.

Gallus. Three cases C. A. D., all lefts; 2 f.; 1, m. Arch. f. Aug., Lit. Rept., 1914, p. 293. Arch. f. Aug., v. XCII, p. 31. Arch. f. Aug., v. LXXXVII, p. 35. Kl. Mb. f. Aug., 1910, v. I, p. 493.

Gradle. C. A. D. l. m. Cited by Duane.

Graefe, Alfred. C. A. D. l. m. generally cited as first case in which retraction mentioned. Also (p. 60) bilat. C. A. D. m. Graefe-Saemisch 1st Ed., 1880, v. VI, pp. 34 and 60.

Green. C. A. D. l. f. Oph. Record, 1908, p. 62.

Green. Four cases C. A. D. 1, r.; 3, l.; all m. Unusual externus pathology in one case. Single adherent tendon; double muscle. General discussion. Trans. Amer. Acad. Oph. and Oto-Lar., 1913, p. 358.

Grimsdale. Tr. Oph. Soc. Un. Kgd., 1913, p. 228.

Griscom. L. E. turns straight up with marked retraction on looking to the right. C. A. D. l. m. Tr. Coll. Phys., Philadelphia, 1915, v. III, p. 415.

Grone. Jahresbericht f. Oph., 1901, p. 414.

Günsberg. Hereditary C. A. D. Four cases in three generations; 2, l. f.; 1, l. m.; 1, bilat. f. Kl. Mb. f. Aug., 1889, p. 264.

Hamburger. C. A. D. r. f. Cb. f. pr. Aug., 1907, p. 11.

Hansen. C. A. D. Bilateral m. Jahresbericht f. Oph., 1913, p. 252.

Harlan. Bilat. C. A. D. m.; with bilat. facial paralysis. Tr. Am. Oph. Soc., 1881, p, 216.

Harlan. Hereditary C. A. D. Mother, l.; daughter, bilat. Trans. Am. Oph. Soc., 1885, p. 48.

Harman. C. A. D., l. f. Much retraction on adduction. He thinks both internus and externus attached near post. poles. Tr. Oph. Soc. Un. Kgd., 1904-5, p. 216.

Harman. C. A. D., l. f. Retraction when eye moved up, down or in. Oph. Rev. 1905. p. 122.

Harris. C. A. D., l. f. No retraction noted. Good result from Hummelsheim operation, with tenotomy of int. rectus. Penn. Med. Journ., 1915-16, v. XIX, p. 495.

Heubner. Bilat. C. A. D. m. Bilat. paralysis of upper 7th and of left lower 7th. Very complete macroscopic and microscopic section of nuclei of eye muscles. Charite-Annalen Berlin, 1900, v. XXV, p. 111.

Heuck. Boy with ptosis and very defective motility, evidently belonging in a different group, but generally included in C. A. D. lists on account of retraction movements. Not included in these statistics. Kl. M. f. Aug., 1879, p. 256.

Hirschberg. Kunn cites 5 cases from H. ot which only 3 (l. m., l. f. and r. f.) are counted in this list. One of these is considered the first reported case of C. A. D. Cited by Kunn. Beit. z. Aug. Heft XIX, p. 5.

Hoefnagels. Two girls with left C. A. D. First detailed exposition of birth-injury theory. Nederlandsch. Tijdschrift v. Geneeskunde, 1914, v. I, No. 8 (English trans. by Blaauw).

Hofmann. Monatschr. f. Geburtskunde, 1854, v. IV, p. 6.
Hummelsheim. C. A. D. r. f. Operated by H's method. Outer part of superior and inferior recti attached to tendon of abducens. Considerable increase of abduction but only when other eye closed. Tr. Heidelberg Oph. Cong., 1907, p. 248.
Inouye. C. A. D. r. m. Affected eye has static divergence of 25'. Oph. Klinik, 1900, p. 285.
Jackson. Bilat. C. A. D. m. Worse right. Not noticed till 5 years old; but history negative and case so typical that it is included. Oph. Record, 1905, p. 248.
Knapp, H. C. A. D. l. f. Accessory posterior attachment of internus found at operation. Arch. of Oph., 1900, p. 311.
Kraus. Hereditary C. A. D. Mother left; son, right. Münch. med. Woch., 1905, p. 1957.
Krieg. Bilat. C. A. D., f. Also left facial paralysis. Jahresbericht f. Oph., 1896, p. 247.
Kunn. Greatest single reservoir of facts and references for congenital eye muscle defects. Cases 69 and 71 are C. A. D., l. f. and l. m. Case 70, bilateral C. A. D., f.; worse left. Neither in these cases nor in others reported later by K. is anything said of retraction, but he evidently overlooked this symptom in the 3 cases afterward reported by Wolff, and probably in others. Beiträge z. Augenheilk. v. II, p. 838.
Kunn. These were cases from K's second list. 9, l. f.; 10, l. m.; 11, bilat. m. Beiträge z. Augenheilk., v. III, p. 21.
Kunn. Further from K's second list. Cases 17 and 18, both r. m., somewhat atypical C. A. D. No retraction or narrowing noted. Cases 12-16 in this list might be considered bilateral C. A. D., but are not counted in these statistics. Beit. z. Aug., v. III, p. 508.
Küstner. Müller's Hdb. d. Gebürtshülfe, 288, p. 95.
Lagrange. Bilat. C. A. D. f.; with bilateral paralysis of upper branch of facial. Ann. d'Oculist., June, 1901, p. 464.
Lagrange. C. A. D. l. m. Case 65 in K's list. Cited by Kunn, Beiträge z. Augenheilk., v. II, p. 765.
Lauber. C. A. D. l. m. Retraction on attempted abduction. Zeit. f. Aug., 1914, v. XXXII, p. 185. Zeit. f. Aug., 1907, v. XVIII, p. 41.
Lawford. Tr. Opht. Soc. U. Kgd., v. VIII, p. 262.
Lechner. C. A. D. l. m. Kl. M. f. Aug., 1897, p. 81.
Lennon. Calif. Southern Jour. of Med., 1910, p. 115.
Lerperger. C. A. D. r. m. Strab. conv. 20°. Secondary contracture? Arch. f. Aug., v. LXXVIII. Lit. Rept. for 1914, p. 293.
Lutz. C. A. D. r. m. Typical case attributed to infantile meningitis. Arch. of Oph., 1917, p. 243.
MacKinlay. Bilat. C. A. D. f. Tr. Oph. Soc. Un. Kgd., 1887, p. 281.
MacLehose. Two cases C. A. D. both l. f. These previously reported in Sinclair's list, not counted here. Tr. Oph. Soc. Un. Kgd., 1896, pp. 299-300.
Magruder. C. A. D. l. f. Nothing said of retraction. Am. Journ. of Oph., 1922, p. 136.
Marlow. C. A. D. l. f. Oph. Record, 1900, p. 6.
Meesmann. Bilat. C. A. D. f. Arch. f. Aug. Lit. Rept. for 1922, p. 423.
Mendel. Bilat. C. A. D. m. Ophthal. Klinik, 1905, p. 115.
Mennerich. Bilat. C. A. D. m. Slight defect of all eye muscles except left oblique and sup. rectus and levator. Defective hands and pectoral muscles. Zeit. f. Aug., May, 1923, p. 173.
Moebius. Bilat. C. A. D. m. Münch. med. Woch., 1888, pp. 35, 91.
Moebius. Two cases of bilat. C. A. D. l. f. Worse left. 2 m. Münch. med. Woch., 1892. pp. 17, 41, 55.
Murdock. Bilat. C. A. D. m. Am. Journ. Oph., 1918, p. 277.
Murray. C. A. D. r. m. No tears from right eye when crying. Oph. Record. 1909, p. 437.
Nedden. C. A. D. l. m. This is a secondary case in the article. Kl. M. f. Aug., 1902, v. II, p. 30.
Parent. Arch. d'Opht., 1893, p. 561.
Parker. Cited by Sinclair.
Peschel. Cb. f. pr. Aug., Jan. 11, 1904.
Peters. Arch. f. Aug., v. LXXXVIII, p. 198.
Pflüger. Two cases of C. A. D. 1, r. f.; 2, r. m. Kl. M. f. Aug., 1876, p. 157.
Polliot. Arch. f. Aug. Lit. Rep., 1914, p. 133.
Posey. Oph. Record, 1915, p. 323.
Propovici. Bilat. C. A. D. f., with double facial paralysis. No lateral motion except on convergence. Arch. f. Aug., 1897, v. XXXIV, p. 34.
Pusey. Two cases of C. A. D. r. m. and l. f. Personal report to author.
Querenghi. Bilat. C. A. D. m.; l. e. worse. Ann. d'Oculist, 1899, v. CXXII, p. 339.
Raia. C. A. D. l. f. Ann. of Oph., July, 1905, p. 433.
Rost. List of 11 cases of C. A. D. including 2 already reported by Birch-Hirschfeld. Of the remaining 9, 5 were l. f.; 1, r. f.; 1, r. m.; 2, l. m. Two of these had so much defect of the other eye that they might well be called bilats. Inaug. Diss. Leipzig, 1908.
Salomonsohn. Two cases C. A. D.; l. f.; and r. m.; latter with r. partial paralysis of facial. This case also reported by Bernhardt. Berlin. klin. Woch., 1899, p. 673. Nothing said of retraction. Kl. M. f. Aug., 1900, p. 772.

Sattler, C. H. C. A. D. l. m. Arch. f. Aug., v. LXVII, p. 206.

Schapringer. C. A. D. l. f. Cited by Duane, pp. 138 and 143. Duane also includes another case of Schapringer which is so atypical that it is not included in this list. The patient (f) had in the left eye no adduction but quite good abduction.

Schapringer. Bilat. C. A. D. f.; with double facial paralysis. No lateral motion except on convergence. Cited by Propovici.

Schmidt. Bilat. C. A. D. m.; with double 7th paralysis, worse left; also absence of left pectoralis. Jahresbericht f. Oph., 1897, p. 233.

Scrini. Arch. d'Opht., 1901, p. 248.

Sidler-Huguenin. Corr. Bl. f. Schweiz. Aerzte, 1903, No. 6.

Sinclair. Five collected cases of C. A. D.; 4, l. f.; 1, l. m. Two of these also reported by MacLehose. The others are Nettleship, 2; Parker, 1. Oph. Rev., 1895, p. 307.

Sharpe. Illinois Med. Jour., 1924, Oct., p. 264.

Snowball. Bilat. C. A. D. f., with bilat. paralysis of 7th worse left. Signs of latter noticed at 3rd week. Squint noticed at 18 mos. Could not walk or talk well until about 3 yrs. old. Drawing of face to right side noticed at 12 mos. Birth normal. No retraction noted. Arch. f. Oph., 1915, v. XC, p. 155.

Spuler. C. A. D. l. m. On adduction eye goes up and fissure narrows. Kl. M. f. Aug., 1903, v. II, p. 208.

Stilling. Case given as probably resulting from meningitis but symptoms indicate C. A. D. l. m. Propulsion noted on abduction. Entstehung d. Kurzsichtigkeit, Wiesbaden, 1887, p. 13.

Tansley. Two cases of C. A. D. 1, r. m.; 2, l. m. Tr. Am. Oph. Soc., 1899, p. 503.

Thomas. C. A. D. l. f. Impossible to move the eye outward beyond the mid line with forceps. Ophthalmoscope, v. II, p. 223.

Thompson and Buchanan. Ophthalmoscope. 1907, p. 16. Tr. Oph. Soc. Un. Kgd., 1902, v. XXIII, p. 307.

Türk. Two cases C. A. D.; 1 bilat., m.; 1 l. f. Deutsch. med. Woch., 1896, p. 199.

Türk. Another C. A. D. l. m. Retraction and propulsion of lower lid on adduction. In this and T's preceding paper first elaborate discussion of retraction in C. A. D. Cb. f. pr. Aug., 1899, p. 14.

Turnbull. Brit. Med. Jour., Nov. 27, 1909.

Tyson. Bilat. C. A. D. f.; worse r. Abst. in Kl. M. f. Aug., 1911, v. II, p. 409.

Ulrich. C. A. D. r. f. U. thinks retractor must have been present. Zeit. f. Aug., v. XXI, p. 178.

Varese. Decidedly atypical case C. A. D. l. m. No adduction. Other motions somewhat restricted. Retraction on attempted adduction and on looking down. Mother affected in the same way. Jahresbericht. f. Oph., 1901, p. 264.

Vogel. Jahresbericht f. Oph., 1900, p. 444.

Waardenburg. Inherited C. A. D. Father and 3 children with left C. A. D. Sex of one child not given, others are l. f.; l. m. Abst. in Am. Journ. of Oph., 1923, p. 44.

Walter. Arch. of Oph., Mar., 1916, p. 187.

Warrington. Bilat. C. A. D. f., with slight right facial paralysis; supernumerary fingers. Oph. Review, 1897, p. 99.

Weeks. C. A. D. l. m. Cited by Duane.

Williams, E. Atypical C. A. D. l. f. showing marked retraction on adduction after (and probably before) tenotomy. Probably the first case of C. A. D. in which retraction mentioned. Also 3 cases probably bilat. C. A. D. but not included on account of poor description. Noteworthy on account of rigid interni. No passive abduction in one. Trans. Am. Oph. Soc., 1875, p. 299.

Witmer. Atypical case of C. A. D. l. m. Arch. f. Aug., 1916, v. LXXXI, p. 201.

Wolff. Two new cases C. A. D. l. f.; and r. m. Also discusses retraction feature of 3 cases previously reported by Kunn, who had failed to notice the retraction. Arch. f. Aug., v. XLIV, p. 179.

Wolff, Hugo. Ophthalmoscope, 1907, p. 484.

In this list are included 15 monolaterals not included in the figures given in the text, thus making in all, including my own cases, 151 monolaterals; 119 lefts and 32 rights. Of the lefts, 75 are females, and 44 males; of the rights, 12 are females and 20 males. Of bilaterals there are 43 in all (including my own 9); 23 were males, 20 females.

Beside the above a number of other cases have been reported. For instance Elschnig (Arch. f. Aug. Lit. Rept. for 1913, p. 55) has reported 7 cases of C. A. D., of which only 3 showed retraction movements; and Jackson (Discussion of Crisp) reports having seen about "half a dozen" cases of the sort; several men also report operating on cases of C. A. D., but as I could not obtain particulars as to the side and sex affected in any of these cases, I do not include them in the above series. I have also seen a reference to Denti (Boll. d'Oculist., 1923, p. 55) in which 2 cases have been given, with a review of the subject, but have been unable to get this original.

PUPILLARY MEMBRANES WITH PUNCTATE CATARACT.

LOUIS LEHRFELD, M.D.

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A girl, whose defective vision was discovered in a school examination, presented on that account. Each eye showed irregular opacities in the center of the pupil, at the anterior surface of the lens, found to be persistent pupillary membrane. There were also white dots of opacity in the same region, looking like stars against a dark sky; which for this resemblance might be called "cerulean cataract"; altho this name has been applied to another form for its bluish color.

Miss Anna B., a school girl, age 15, applied at the clinic of Dr. George S. Crampton, Pennsylvania Hospital, early in April 1924, for examination of the eyes because of defective vision, which was first noticed by the school physician. There were no symptoms of asthenopia, and the child's attention was first called to her defective eyesight when tested in the routine of classroom physical examination.

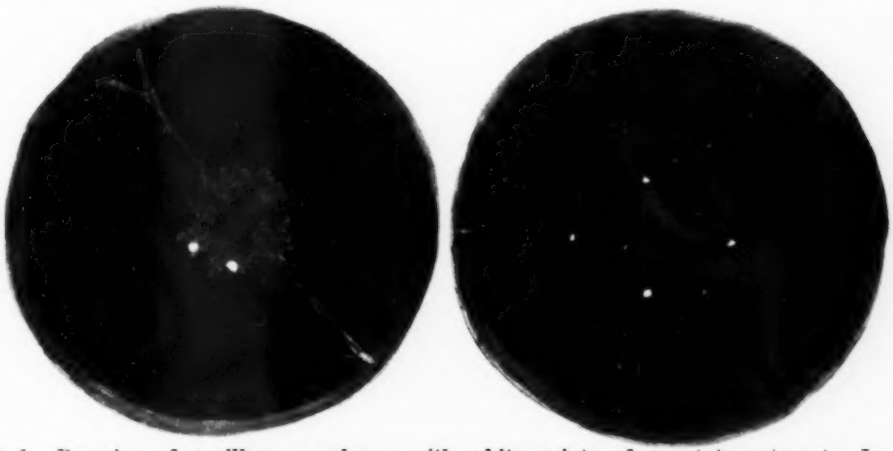

Fig. 1. Remains of pupillary membrane with white points of punctate cataract. In the right eye threads connect the central opacity with the anterior surface of iris. In the left there are no connecting threads.

The external findings were negative. The pupils dilated by a cyclopegic on April 5, 1924, showed by indirect illumination irregular opacities in the center. The opacity in the right was a jagged edged irregular round plaque of tissue resembling iris structure, pigmented dark brown, just as the iris, and attached to the lesser circle of the latter by a straight strand of like tissue from seven o'clock to the edge of the central pupillary mass. Another strand extended from the exact opposite end of this mass across the pupillary opening and branching like a Y inserted in the upper nasal quadrant of the iris border. This opacity and strands across the pupil are remains of the pupillary membrane.

Appearing in the crevices of the central irregular remains of the membrane, corresponding to 9 and 11 o'clock, are 2 white, prominent spots, pin head in size and appearing like chalk dots on a blackboard. The slit lamp reveals these bodies like sharply defined starch granules just below the lens capsule. The remains of the pupillary membrane are distinctly seen studded with cross like pigment granules.

The left eye shows an irregular dark brown plaque in the central pupillary area surrounded at unequal distances by six white dots, three of which are chalk white, while the other three are faint and milky. The slit lamp again reveals the central plaque as a remnant of the pupillary membrane or embryonal vascular tunic, studded with pigment granules. The white cataractous dots are just beneath the anterior capsule of the lens situated at various depths, the brighter spots in starch granule crescentic arrangement and dense in structure, while the deeper and fainter dots are homogeneous and translucent. These cataractous dots appear like bright luminous stars against a black or very dark sky. It is for this reason I assume they may be classed as cerulean cataracts.

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TREATMENT OF IRIDOCYCLITIS BY SUBCONJUNCTIVAL INJECTIONS OF ATROPIN AND EPINEPHRIN.

FRANK H. RODIN, M.D.

SAN FRANCISCO, CALIFORNIA.

This report, from the Department of Ophthalmology of the Stanford University Medical School, states the objections to such a line of treatment, that are to be found in the literature. It then describes the relatively simple technic used. It gives the results and conclusions drawn from nineteen cases, thus treated in the University Eye Clinic, with details regarding thirteen of them. Prompt alleviation of all symptoms was obtained, except as to breaking up of old adhesions. Symptoms of atropin poisoning were produced in three cases, but it is believed this can be avoided by giving smaller doses of atropin.

None of the standard text books on ophthalmology mention the use of subconjunctival injections of epinephrin or atropin in iridocyclitis. Darier[1] states that subconjunctival injections are contraindicated in all acute inflammatory processes of the iris and the ciliary body. He refers especially to the use of cyanid of mercury.

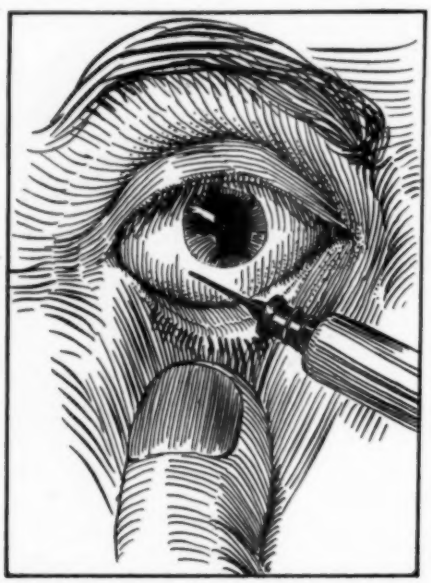

Fig. 1.—The posterior synechiae are in the lower temporal part of the right eye. The needle is introduced along the limbus close to the adhesions.

At the 1923 annual meeting of the French Ophthalmological Society, both Van Lint[2] and Dufour[3], the latter probably the most enthusiastic advocate of subconjunctival injections in eye conditions, reviewed the subject of subconjunctival medications, but they made no mention of the use of epinephrin and atropin subconjunctivally. A review of the literature fails to reveal any report of the use of epinephrin and atropin combined subconjunctivally in iridocyclitis. The encouraging reports of the use of subconjunctival injections of epinephrin in increased intraocular tension suggested its use in combination with atropin in iridocyclitis.

TECHNIC.

This is very simple. It can be done at the office. No speculum or forceps is used. A 1½ c. c. graduated Luer syringe with a small hypodermic needle, sterilized in the usual way, is used. The cocain, atropin and epinephrin should be sterile. At the Stanford University eye clinic, both the one c. c. ampules of epinephrin and the bottled drug were used. In office practice, the former will prove more practical. The epinephrin used was 1:1000.

About twice as much drug is drawn into the syringe as may be required, as part of it may escape when attempting to make the injection. The eye is anesthetized with a few drops of cocain (4 per cent) and the instillation is repeated in three minutes. Five minutes later the eye is ready for the injection. Lately I have been using two drops of cocain (4 per cent) and three minutes later one drop of cocain, 10 per cent. No cocain is added to the atropin and epinephrin. Half of the solution to be used is injected above the upper portion of the limbus and the rest below the lower part of the limbus. In case the posterior synechiae are localized at a certain part of the iris, the injection is made along the limbus close to the adherent part (Fig. 1).

Fuchs[4] recommends that a subconjunctival injection should not be made too near the limbus. Darier[1] says: "The liquid injected must not be allowed to return to the limbus, where it may detach or obstruct the peri-

corneal vascular circle. Trophic disturbances of the cornea and subconjunctival cicatrices may follow injections practiced too near the limbus." I saw no ill effects from the subconjunctival injections, no matter how close to the limbus they were made. I usually inject as close to the limbus as possible.

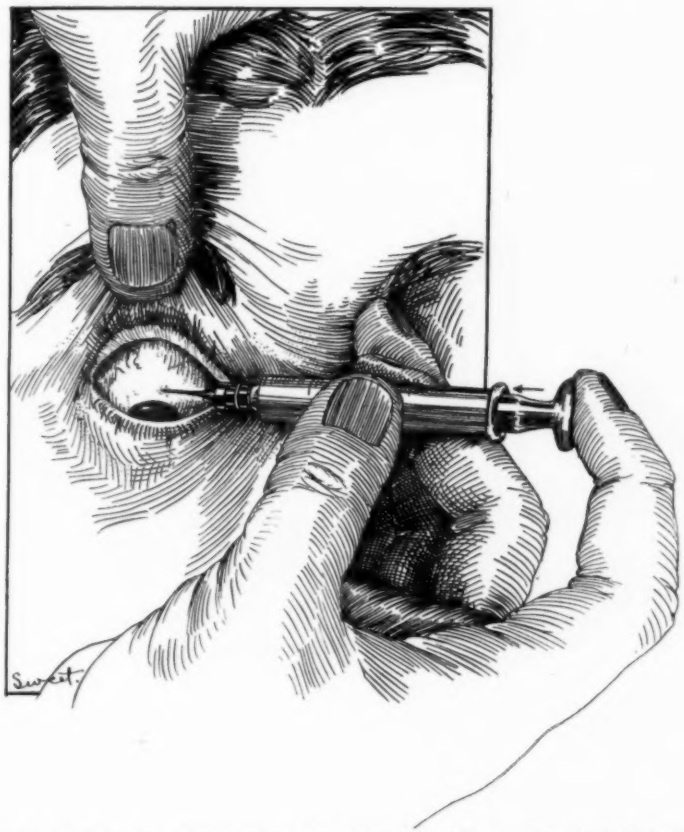

Fig. 2.—Method of injecting the upper part of the right eye. The syringe is held between the thumb and the middle finger of the right hand, the plunger being controlled by the index finger. The ring and little fingers of the right hand are resting against the left side of the nose. The patient is looking downward and the upper eyelid is raised by the thumb of the left hand. The rest of the hand, not shown in the figure, rests on the patient's forehead. The syringe is held horizontally and nearly parallel with the surface of the sclera. The needle is introduced a few mm. above the limbus.

The patient sits in a chair and he is made more comfortable if the back of his head is held by a nurse or assistant. The surgeon stands in front of the patient. The syringe is held between the thumb and the middle finger of the right hand, while the index finger controls the plunger. The thumb of the left hand is used to raise the upper eyelid, or pull down the lower lid.

In injecting the right eye (Fig. 2), the ring and little fingers of the right hand are allowed to rest on the left side of the nose. The left hand rests on the forehead and the thumb raises the upper lid. I usually inject the upper part of the eye first. The patient is asked to look all the way downward toward his feet. With the left hand resting on the right forehead the upper lid is raised. The syringe is held horizontally and nearly parallel with the surface of the sclera. The needle is introduced beneath the conjunctiva a few mm. above the limbus. Half of the amount to be given is quickly injected and the quantity used is read off the graduated syringe. A small bleb is formed at the point of injection. No massaging of the bleb is necessary as it subsides in a few minutes. As soon as the upper part of the eye is injected, the needle is quickly withdrawn and with the little

and ring fingers of the right hand still resting on the nose, the left hand is shifted so that the palm rests on the right cheek. The patient is asked to look all the way upward toward the ceiling, and the lower lid is pulled down by the thumb of the left hand. The needle is introduced a few mm. below the limbus and the remaining portion of the solution to be used is injected. Hot towels are then applied to the injected eye for half an hour.

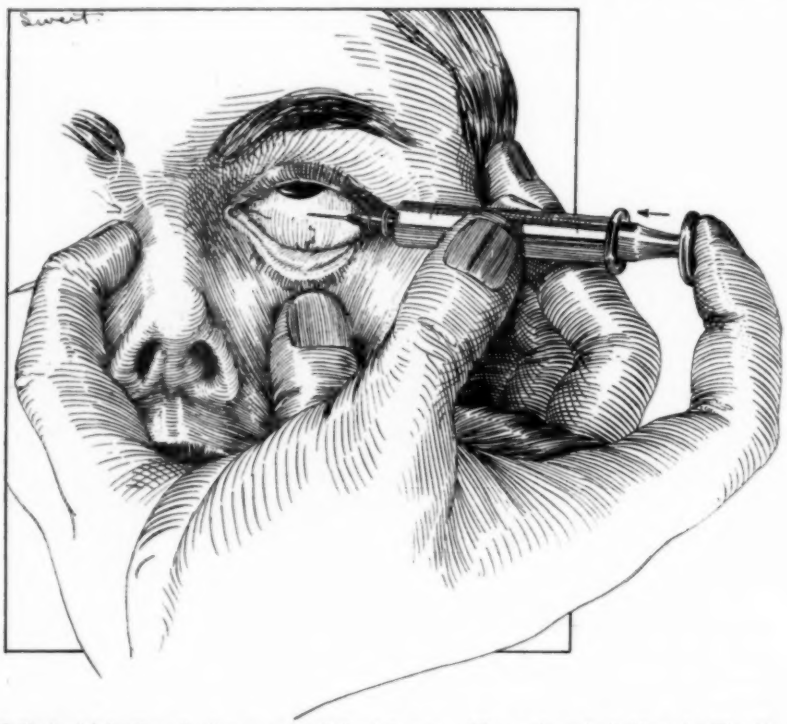

Fig. 3.—Method of injecting the lower part of the left eye. The syringe is held as in Fig. 2. The ring and little fingers of the right hand are resting on the left cheek. The lower eyelid is pulled down by the thumb of the left hand with the rest of the hand lying on the right side of the nose. The needle is introduced a few mm. below the limbus.

In injecting the left eye (Fig. 3), the ring and little fingers of the right hand rest on the left cheek bone and the left hand rests on the forehead when the upper part of the eye is injected. For the injection of the lower part, the left hand is shifted so that it rests on the right side of the nose.

The patient will often complain of a pulling sensation which is due to the breaking of the posterior synechiae. This usually disappears in half an hour or less. In some cases the separation of the synechiae takes place almost simultaneously with the withdrawal of the needle and the iris is seen breaking away from the adhesions and the pupil dilating.

The size of the pupil is measured by a pupillometer. This is a metal disc in which there are a number of circles which are scaled from one to ten mm. The disc is held close to the observed eye and rotated till the circle that matches the pupil in size is reached. The pupillometer found on the back of a Morton ophthalmoscope can be used and the size of the pupil compared with the scaled circles.

SUMMARY OF CASES.

In reporting the cases no distinction is being made between iritis, cyclitis and iridocyclitis, for as Fuchs[5] states: "Unmixed inflammation of the iris (iritis) or of the ciliary body (cyclitis) is rare; in most cases we have to do with a combination of the two (iridocyclitis)." All cases are therefore reported as iridocyclitis.

There were nineteen cases of iridocyclitis treated at the Stanford Uni-

versity eye clinic since October 1924, with twenty-seven subconjunctival injections, in which instillations of atropin did not bring about the maximum dilatation of the pupils. The notes on the first six cases are too incomplete to justify inclusion in this report. The following which received about twenty subconjunctival injections are reported in this paper.

CASE 1 (Fig. 4). *Acute Iridocyclitis Following Injury, Foreign Body Imbedded in the Cornea.* April 27, 1925 G. S., a laborer, aged 23 years, while chopping was struck by a chip (of wood?) in the left eye. Examination revealed an irregular star shaped foreign body imbedded in the cornea, about 5 o'clock and 4 mm. from the limbus. The pupil reacted sluggishly to light, was irregular and oval shaped, with a vertical diameter of 3 mm. and a horizontal of 2 mm. The iris was muddy in appearance and the eyeball tender. The foreign body was removed and it appeared to be wood. The patient was admitted to the hospital.

Atropin 4 per cent was repeatedly instilled in the eye. At the end of 5 hours the pupil was pear shaped with a vertical diameter of 6 mm., and a horizontal of 5 mm. in the upper part, and 3 mm. in the lower part. Three minims of atropin 4 per cent were injected at the lateral sides of the limbus. The patient also received 15 c. c. of milk intramuscularly into the buttocks. Half an hour later the lower part of the pupil was the same size as the upper part.

On the following day the pupil was almost round with a vertical diameter of 6 mm.; and a horizontal of 6 mm. in the upper part and 5 mm. in the lower. A subconjunctival injection of 2½ minims of atropin 4 per cent and 2½ minims of epinephrin 1:1000 was given. The pupil began to dilate in all directions soon after the injection. Half an hour after the injection the pupil was round and dilated ad maximum.

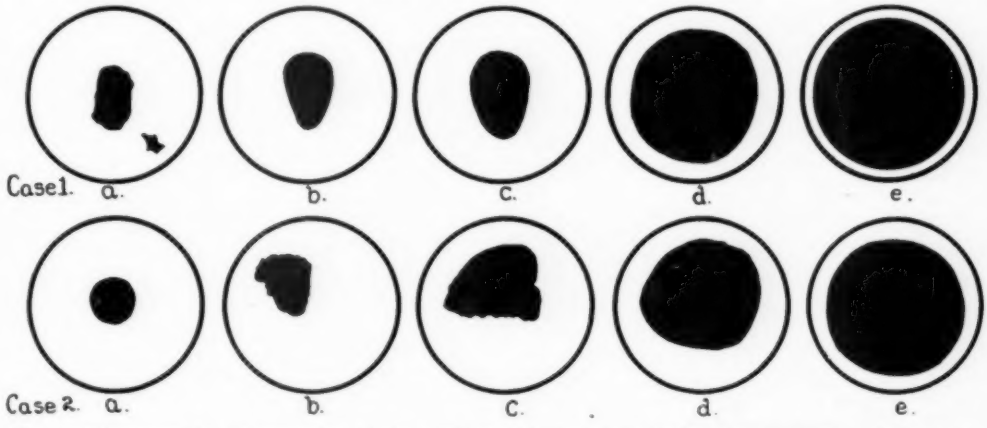

Fig. 4.—Diagrammatic representation of the pupil at different stages during the treatment. Case 1: a, size of the pupil at the time of examination; the foreign body imbedded in the cornea is seen in the lower nasal part; b, five hours later, after instillations of atropin; c, half an hour after a subconjunctival injection of atropin; d, soon after the injection of atropin and epinephrin; e, half an hour after the injection of atropin and epinephrin. Case 2: a, size of pupil at the time of examination; b, three hours later, after instillations of atropin and the use of crystals of atropin; c, six hours after a subconjunctival injection of atropin; d, nine hours after an injection of epinephrin; e, two hours after an injection of atropin and epinephrin.

Instillations of atropin caused only a partial dilatation of the pupil. A subconjunctival injection of atropin alone, had little effect. The combined injection dilated the pupil to its maximum in half an hour.

CASE 2 (Fig. 4). *Acute Iridocyclitis, Syphilitic.* April 30, 1925, S. A., a Filipino porter, aged 23 years, had had soreness in the right eye of one week's duration. There was no history of previous attacks. Examination of the right eye revealed ciliary injection with a discolored muddy iris. The iris markings were indistinguishable and small heaped up areas of exudate were seen scattered over it. The patient was admitted to the hospital. The pupil

was round, 2 mm. in diameter, and did not react to light. Atropin 4 per cent and crystals of atropin were used in the eye every hour. At the end of 3 hours the pupil was eccentric, lying upwards and temporally, and irregularly oval in shape with a vertical diameter of 3.5 mm. and a horizontal of 3 mm. in the upper part, and 2 mm. in the lower. Three minims of atropin 4 per cent were injected.

Six hours later the pupil was still an irregular oval but had opened upwards. The vertical diameter was 4.5 mm. and the horizontal 4 mm. in the upper part, and 6 mm. in the lower part. The oblique diameter between one and seven o'clock was 6 mm. A subconjunctival injection of 6 minims of epinephrin was given.

On the following morning the pupil was oval with its maximum dilatation in the upper part. The vertical diameter was 6 mm. and the horizontal 7 mm. A subconjunctival injection of 2½ minims of atropin 4 per cent and 2½ minims of epinephrin was given.

Two hours later the pupil had further dilated. The vertical diameter was 7 mm. and the horizontal 8 mm. The Wassermann reaction was positive.

Instillations of atropin and the placement of crystals of atropin in the conjunctival sac had little effect in three hours. A subconjunctival injection of atropin partially dilated the pupil and an injection of epinephrin caused a further dilatation. The combined injection next day brought about a still further dilatation.

CASE 3. *Acute Iridocyclitis, Following Trauma, with Hypopyon.* Feb. 2, 1925, J. C., school boy, aged 16 years, had been accidentally struck two days before in his left eye with the end of a closed pocket knife. Patient said that he thought the eye was closed at the time the knife struck him. His vision was: right, 15/15; left, hand movement.

Examination of the left eye revealed a marked palpebral and bulbar conjunctival injection; ciliary injection; discolored iris. The cornea was dull and had an irregular superficial cut at the center of its epithelium with mutton fat deposits on its posterior surface. The pupil was contracted to 1½ mm. in diameter. Posterior synechiae were present. Opacities were seen on the anterior lens capsule as three irregular lines radiating from the center towards the periphery of the lens. The fundus was not seen. A hypopyon 1½ mm. high was present.

Atropin 4 per cent was instilled a number of times. Two hours later the pupil was 4 mm. in diameter. A subconjunctival injection of 3 minims of atropin 4 per cent and 3 minims of epinephrin was given. The pupil began to dilate soon after the injection and half an hour later the diameter was 10 mm.

Four hours after the subconjunctival injection the patient became irrational. He talked nonsense, got out of bed and insisted upon going out of the room. Patient had to be restrained by tying his arms. A 1/6 gr. morphin hypodermically was given; slept well and was rational in the morning.

On the following day the pupil was well dilated being 10 mm. in diameter. The capsule of the lens was covered with exudate. (The three irregular lines that were seen on the previous day were a part of the exudate.) The cornea was clearer and the hypopyon was gone. The patient received 12 c. c. of milk intramuscularly.

Feb. 7, the vision of the left eye was 20/40. Some exudate was still present on the anterior lens capsule. Daily instillations of atropin 4 per cent were given. The patient was dismissed from the hospital. The next day being Sunday, the patient was not seen.

Feb. 9, examination of the left eye revealed a marked bulbar and ciliary injection; contracted pupil; posterior synechiae. The vision of the left eye was 15/100. Atropin 4 per cent was instilled a number of times. Two hours later the pupil looked like the figure "8" with the center partly open. The vertical diameter was dilated to the maximum and the horizontal upper and lower maximum diameters were 6 mm. A subconjunctival injection, at the vertical sides of the limbus, of 2 minims of atropin 4 per cent and 2 minims of epinephrin was given. There

was an almost instantaneous dilatation of the pupil in a horizontal direction. Five minutes later the pupil was round and dilated ad maximum. The patient was admitted to the hospital for the night. There was no reaction to the injection. The patient was treated for two weeks with a daily instillation of a drop of atropin 4 per cent.

April 18, the vision of the left eye was 15/15 and it was negative to examination.

A case of acute iridocyclitis with hypopyon where repeated instillations of atropin had very little effect and the combined injection dilated the pupil to the maximum in half an hour. The hypopyon had cleared up the following morning.

CASE 4. *Acute Iridocyclitis. Etiology: Retrotonsillar Abscess and Low Grade Hyperplastic Postethmoidal Sphenoiditis.* May 7, 1925, G. W., male medical student, aged 25 years, had had soreness in the left eye off and on for three weeks. He complained of slight pain "on changing focus." The eye had been somewhat worse on the previous day. Examination revealed a superficial bulbar injection with a moderate ciliary injection. The pupil reacted to light. The iris was a slightly deeper color than that of the right. The cornea and the aqueous were clear. Atropin one per cent was instilled. The pupil dilated freely and there were no synechiae. A small aggregation of minute dots were seen in the lower nasal corner of the cornea with a plus twenty lens. Two days later the condition was the same. Atropin 4 per cent dilated the pupil with ease.

May 11, the eye was not so painful. Examination revealed the same picture as on the 7th. Atropin 4 per cent dilated the pupil with ease. There was slight pain at night. Examination on the following day showed a contracted pupil, 2½ mm. in diameter, with two posterior synechiae at the upper border. The eye was very tender. Atropin 4 per cent was instilled a number of times. Two hours later the pupil was oval and eccentric towards the nasal side, with a vertical diameter of 6 mm. and a horizontal of 4 mm. A subconjunctival injection of 2 minims of atropin 4 per cent and 2 minims of epinephrin was given. Ten minutes after the injection the pupil was dilating and almost round. Half an hour after the injection the pupil was round and 8 mm. in diameter.

May 14, pupil was dilated to 7 mm. in diameter. The eye was quiet and the pain was gone. A Wassermann test taken two months ago was negative. A roentgenogram of the teeth was negative. Postnasal examination showed a low grade hyperplastic postethmoid sphenoiditis. The tonsils appeared septic. On doing a tonsillectomy, an abscess was found behind the left tonsil. The sphenoethmoid condition was treated with phenol injections as recommended by Sluder[6].

June 5, the eye was quiet and free from signs of inflammation. The postnasal condition was clearing up.

CASE 5. *Acute Iridocyclitis with Interstitial Keratitis (?).* May 7, 1925, A. G., housewife, aged 39 years, had had in the last two years several painful attacks in both eyes. The right eye had been painful for four days. Examination of the right eye revealed bulbar and ciliary injection with grayish white opacities on the posterior surface of the cornea temporally and below. The pupil was contracted to 2 mm. in diameter and did not react to light; the fundus was not seen; the eyeball was tender. The patient received instillations of atropin 4 per cent and placement of crystals of atropin in the conjunctival sac every hour. The patient was admitted to the hospital.

At the end of five hours the pupil was round and 5 mm. in diameter. A subconjunctival injection of 6 minims of epinephrin was given. Ten minutes after the injection the pupil was dilating and had a vertical diameter of 8 mm. and a horizontal of 7 mm., and ten minutes later the pupil was round and 8 mm. in diameter.

On the following day the pupil was round and 7 mm. in diameter. The patient stated that after the instillation of atropin she felt dizzy as if she were going to faint, her limbs felt heavy and she found it hard to talk. The patient slept well and felt normal in the morning. Examination with the pupil dilated showed the temporal side of the

cornea occupied by a diffuse opacity, grayish in color, with a center of still denser opacity. The opacity appeared to be interstitial in character.

May 22, the patient was unable to come till this day. The redness and the pain of the eye had gone. The pupil was round and 3 mm. in diameter. A drop of atropin 4 per cent was instilled in the eye. Half an hour later the pupil was dilated to 7 mm. in diameter.

June 7, the patient did not report till this day, and had no treatment during her absence from the clinic. The corneal opacity was clearing up. The pupil dilated with ease under atropin 4 per cent. The Wassermann reaction was negative.

The instillations of atropin and the use of atropin crystals only partially dilated the pupil. A subconjunctival injection of epinephrin had an almost instantaneous result.

CASE 6. *Acute Iridocyclitis, Syphilitic.* Jan. 13, 1925, T. S., male, aged 40 years, had had pain in the left eye for three days. Examination showed a tender left eye with intense bulbar and ciliary injection; contracted pupil; hazy cornea; discolored iris; marked lacrimation. The patient was given instillations of atropin 4 per cent. One and a half hours later the pupil was pear shaped, with a vertical diameter of 1½ mm. and a horizontal of 3 mm. A subconjunctival injection of 5 minims of atropin 4 per cent was given.

On the following day the dilatation obtained was very slight. Instillations of atropin 4 per cent were used but it had no effect on the pupil. A subconjunctival injection of 6 minims of epinephrin was given. Half an hour later the pupil was round with a vertical diameter of 7 mm. and a horizontal of 8 mm. The Wassermann reaction was positive.

Instillations of atropin had very little effect and an injection of atropin had no further effect. A subconjunctival injection of epinephrin the next day, after further instillations of atropin, gave almost an instantaneous dilatation.

In this case as well as in Case 5 the eyes had already been well atropinized before the injection of epinephrin and this will explain the rapid action of the epinephrin.

CASE 7. *Acute Iridocyclitis. Etiology Undetermined.* Feb. 13, 1925, Q. T., male, Chinese, aged 49 years, had had painful eyes for three weeks. Examination of the right eye showed an irregular pupil, of 5 mm. in diameter with posterior synechiae. The left eye also showed an irregular pupil, 2½ mm. in diameter, with posterior synechiae. Atropin 4 per cent was instilled in both eyes. The right eye dilated ad maximum. The left eye was dilating very slowly and the pupil remained irregular. Three minims of atropin 4 per cent and 3 minims of epinephrin were injected. The pupil of the left eye was well dilated in half an hour. On the following day both pupils were well dilated. The Wassermann reaction was negative.

Here, as well as in Case 4, instillations of atropin and the use of crystals of atropin had only a slight effect, and a combined injection dilated the pupils to their maximum.

CASE 8. *Acute Iridocyclitis Right Eye. Old Iridocyclitis with Artificial Coloboma Left Eye. Etiology Undetermined.* April 2, 1925, Y. A., male, Chinese, aged 45 years, had had a painful right eye of four days duration. He had had two attacks of iridocyclitis in the left eye in 1915. The examination of the left eye at that time showed posterior ring synechiae with iris bombé. An iridectomy was done on the left eye. In 1917 he had had a fresh attack of iridocyclitis in the left eye which subsided under treatment.

Examination of the right eye revealed bulbar and ciliary injection; irregular and contracted pupil; discolored iris. After repeated instillations of atropin 4 per cent and the use of atropin crystals, the pupil became irregularly oval with a vertical diameter of 4½ mm. and a horizontal of 4 mm. A subconjunctival injection of 2½ minims of atropin 4 per cent and 2½ minims of epinephrin was given. The pupil dilated to its maximum in the upper part. There was only a partial dilatation in the lower half. The patient did not return for further treat-

ment. A Wassermann test taken in 1920 was negative.

CASE 9. *Acute Iridocyclitis. Dental Origin.* Dec. 8, 1924, M. M., sailor, aged 54 years, had had pain in the left eye for one month. The vision with correction was: right 15/15, left 15/70. Examination showed left eye markedly injected and tender with a discolored iris. The pupil was contracted to 2 mm. in diameter, with exudate around it. Atropin 4 per cent was instilled in the eye without any effect upon the pupil. Four minims of atropin 4 per cent and one minim of epinephrin were injected. Pupil dilated to 6 mm.

One week later the pupil was round and eccentric upwards with a diameter of 6 mm. A subconjunctival injection of 5 minims of atropin 4 per cent was given. There was a further dilatation of the pupil. The dental report was: "The remaining teeth were involved in an extensive pyorrhea. The alveolar process was considerably reduced. Extraction of the remaining teeth was advised and done." The Wassermann reaction was negative.

Feb. 3, 1925, the patient stated that the vision of the left eye improved. Pigment was present on the anterior lens capsule. The pupil reacted to light. Vision of the left eye with correction was 15/50.

CASE 10. *Acute Iridocyclitis. Etiology Undetermined.* April 28, 1925, A. K., chambermaid, aged 50 years, complained of a mist before her eyes for one month. She had been treated by doctors but without improvement. Examination of the left eye revealed an irregular pupil, which resembled an irregular square with sides of 4½ mm., with posterior synechiae. The iris was attached to almost the whole of the pupillary margin. A subconjunctival injection of 2½ minims of atropin 4 per cent and 2½ minims of epinephrin was given. In half an hour the pupil dilated to its maximum, 9 mm. in diameter. The patient felt dizzy and had a few fainting spells during the night. The Wassermann reaction was negative. A roentgenogram of the sinuses was negative.

Here we have an iridocyclitis which had been treated without improvement and where a combined injection gave a maximum dilatation in half an hour.

CASE 11. *Corneal Opacities with Old Posterior Synechiae. Tuberculous.* G. R., a Greek peddler, aged 35 years, was first seen at the clinic on Feb. 13, 1925. In Nov. 1923 small vesicles appeared on the left cornea. These did not break. In 1923 his vision had begun to fail and on examination was light perception only. In Feb. 1924, a similar condition appeared on the right eye and on examination the vision of the right eye was hand movement.

Examination showed enlarged glands in the neck. One was removed and proved to be tuberculous. Clinical examination and roentgenogram of the chest was negative.

The right eye showed a white scar which covered the lower temporal part of the cornea. The pupil was small, vertical oval in shape, and did not react to light or accommodation. Posterior synechiae were present and there was also an organized exudate on the anterior lens capsule. The entire cornea of the left eye was covered with a white opacity.

Atropin 4 per cent was instilled in the right eye but had no effect on the pupil. A subconjunctival injection of 2 minims of atropin 4 per cent and 2 minims of epinephrin was given. The iris receded about half a mm. from its pupillary attachment after the injection. The patient was placed on tuberculin treatment.

May 15, there had been no improvement in vision.

CASE 12. *Old Iridocyclitis. Syphilitic.* April 30, 1925, J. L., Fillipino helper, aged 26 years, had had pain in the right eye since November 1924. He said that the juice of a decayed apple got into his eyes. His vision was: right 20/200, left 20/20. Examination of the right eye revealed a soft eye; deep ciliary injection; deposits in the tissue of the cornea, or on its posterior surface. The pupil was irregular and eccentric with a vertical diameter of 3½ mm. and a horizontal of 3 mm. The patient was admitted to the hospital. Atropin 4 per cent was instilled in the eye and crystals of atropin were placed in the conjunctival sac every hour. Three

hours later there was no effect on the pupil. Three minims of atropin were injected. The patient was restless during the night and would not remain in bed until after midnight. He was rational in the morning.

On the following day there was no dilatation of the pupil. A subconjunctival injection of 2½ minims of atropin 4 per cent and 2½ minims of epinephrin was given. There was no effect on the pupil. The Wassermann reaction was positive.

CASE 13. *Acute Iridocyclitis Right Eye. Old Iritis with Posterior Synechiae Left Eye. Etiology Undetermined, (Dental?).* Jan. 13, 1925, M. P., male, aged 55 years, had had frontal headaches and watering of the eyes. Examination of the right eye showed tenderness; marked palpebral and bulbar conjunctival injection; ciliary injection; discolored iris; irregular pupil. In the left eye the pupil was contracted with posterior synechiae at the lower border of the iris. Atropin 4 per cent was instilled in both eyes.

Ten days later, the pain in the right eye disappeared and the pupil was dilated. In the left eye the pupil was still contracted. A subconjunctival injection of 2 minims of atropin 4 per cent and 4 minims of epinephrin was given in the left eye. There was no effect on the pupil one hour later.

The next day the left eye showed a definite loosening of the synechiae in the lower part of the iris. The pupil was somewhat more dilated. The Wassermann reaction was negative. The dentist advised the extraction of the upper right molar.

The last three were cases with old posterior synechiae. In two cases the effect of the injection was very slight and there was no result in the third.

DISCUSSION.

Acute iridocyclitis is an emergency, in the sense, that it calls for immediate treatment. No case of iridocyclitis may be considered under control unless all synechiae are broken down and the pupil is dilated to its maximum. The greater the delay in getting the pupil dilated, the greater the possibilities of sequelae, which are: posterior synechiae, pupillary membrane, exudate between the iris and the lens, atrophy of the iris, exudate in the vitreous, changes in the cornea, and opacity of the lens. Further, recurrences are more frequent when the synechiae are left behind. With the dilatation of the pupil the hyperemia of the iris is lessened, the inflamed organ is put at rest, the photophobia passes off, vision improves, there is a gradual diminution in the severity of the eye pain, and the patient's condition begins to improve. Once the pupil is under control and with the application of such systemic treatment as may be called for, one may look forward to a cure of the iridocyclitis.

The "sheet-anchor" of the treatment is atropin. However, there are cases where the usual method of instilling atropin fails to break the adhesions which have already formed. The ten cases of acute iridocyclitis, which are reported, were of the latter type, in which the repeated use of atropin failed to dilate the pupil to its maximum and where a subconjunctival injection of atropin and epinephrin brought about the desired effect.

Owing to the use of relatively large doses of atropin, there were three cases (3, 10, 11) of atropin poisoning. In Case 5 there was no injection of atropin and the symptoms were due to the instillations. The patient probably had an idiosyncrasy to the drug. None of these cases called for any special treatment, except Case 3 which received a hypodermic injection of morphin. All the patients were apparently recovered the next morning. I saw no ill effects from the subconjunctival injection of epinephrin.

Taking the cases as a whole, it appears to me that it is not so much the large dose of the atropin used as the added epinephrin which brought about the desired dilatations. It is my intention in the future, to use two minims of atropin 2 per cent and four minims of epinephrin. This will eliminate the possibility of atropin poisoning and in all probability have the same effect.

The routine method at the Stanford University eye clinic is as follows: if a case is diagnosed as acute irido-

cyclitis, instillation of atropin 4 per cent is instituted at once. This is repeated every half an hour. If within two hours, after the first instillation, a good dilatation is not obtained, a subconjunctival injection of atropin and epinephrin is given. Hot applications are applied to the eye for half an hour. If good dilatation is obtained after the injection, the patient is sent home, otherwise he is admitted to the hospital for further treatment. The patient reports daily to the eye clinic and in the meantime a search for the etiology of the iridocyclitis is made. When the cause is found the necessary systemic treatment is instituted in addition to the local treatment.

If the patient is over forty-five, or there is a slight increase in the intraocular tension, homatropin, one per cent, is used and the effect of the drug on the tension is observed. If there is no increase in the tension, atropin one per cent is used. This is followed by atropin 4 per cent, if the tension is still unaffected. If there is a marked increase in the tension a subconjunctival injection of six minims of epinephrin is used and when the tension is reduced, instillations of atropin are instituted and followed by subconjunctival injections, if necessary.

In cases of increased intraocular tension which cannot be lowered by an injection of epinephrin, and in which the use of atropin has the tendency to increase the tension, we are, as Elliot states, "between Scylla and Charybdis." Such cases are studied individually and the treatment instituted is that which will give hope of best results.

If one has definite evidence that glaucoma is due to the iridocyclitis, the logical treatment appears to be atropin, to be followed, as Elliot[7] suggests: "By surgical means without any delay, if the exhibition of this drug should result in an increase, instead of in a decrease of the acuteness of the symptoms present." This is a further reason why an early dilatation of the pupil should be aimed at in all cases of iridocyclitis and so prevent the sequelae which lead to the increase of the intraocular tension.

As the increase in the tension is due to the iridocyclitis, the prompt treatment of the latter takes care of the tension. There is enough clinical evidence already reported by many ophthalmologists to show that subconjunctival injections of epinephrin will reduce increased intraocular tension in many cases. The injections of the combined drug can safely be used in all cases of acute iridocyclitis failing to dilate under atropin alone. Case six was forty years old; case seven, forty-nine; case eight, forty-five; case nine, forty-four; case ten, fifty; case thirteen, fifty-five. In none of these cases was there an increase in intraocular tension noticed after the injections.

Prompt alleviation of all symptoms was noticed after the injections. Since the use of the combined injections in cases in which instillations of atropin failed to dilate the pupil, there have been no posterior synechiae as sequelae to a case of acute iridocyclitis in this clinic.

The mechanism of action of the two drugs combined is not understood. Gradle[8] thinks that in glaucoma the epinephrin stimulates the sympathetic nerve fibers with resulting contraction of the vessels of the choroid and the ciliary body. This contraction produces a decrease in the intraocular content and thereby lowers the pressure in the vitreous chamber somewhat below that of the anterior chamber. The alternative theory is that the drug, by contracting the iris, reduces the thickness of the iris and allows the intraocular fluids access to the angle of the anterior chamber.

Any conception of the modus operandi of the combined drugs must include the following well known facts pertaining to the pharmacologic action of the drugs, namely, that atropin paralyzes the oculomotor nerve fibers in the sphincter of the iris and in the ciliary muscle; that epinephrin stimulates the sympathetic endings of the iris and blood vessels, and that cocain acts as a local anesthetic and also stimulates the sympathetic. Whatever the ultimate explanation may be, the fact remains that in the cases here reported, in which instillations of atropin failed to dilate the pupil to the maxi-

mum, the combined injection of atropin and epinephrin brought about the desired result.

CONCLUSIONS.

1. In ten cases of acute iridocyclitis in which instillations of atropin (4 per cent) failed to dilate the pupils to the maximum, a combined subconjunctival injection of atropin and epinephrin, by the method described, dilated the pupils to the maximum.

2. The combined injection appears to have little or no effect in old adhesions. In three cases, there was no effect in one and a slight separation in the other two.

3. A subconjunctival injection of atropin and epinephrin should be used where instillations of atropin or the use of crystals of atropin fail to dilate the pupil. This should be repeated if necessary.

4. Age is not a contraindication to the injection.

5. Where for any cause a rapid or instantaneous dilatation of the pupil is called for, a subconjunctival injection of two minims of atropin, 2 per cent, and four minims of epinephrin, 1:1000, is indicated.

6. Further clinical observations of the use of the combined injection are desirable in order to arrive at a decision as to its final usefulness in breaking down old adhesions, the safest and the most effective dose of the two drugs, and the mechanism of action of the two drugs.

I wish to express my sincere appreciation and thanks to Dr. Albert B. McKee for the privilege of including in this report case histories from his private practice and from the clinic of the Stanford University Medical School; also for his many suggestions and criticisms which made possible this report.

Stanford University Hospital.

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ORBITAL CELLULITIS FOLLOWING HORDEOLUM.

JOHN GREEN, JR., M.D.

ST. LOUIS, MO.

The usual causes of orbital cellulitis are mentioned. A case is reported in which it started from a stye, and involved the depth of the orbit and neighboring parts. Complete blindness with optic atrophy resulted. Improvement began only after repeated, very extensive incisions, with other active treatment. Somewhat similar cases are referred to. Read before the American Ophthalmological Society, May 5, 1925.

In the presence of inflammation of the orbit or, as it is generally termed, orbital cellulitis, in which the etiology is not immediately apparent, one is inclined to hazard the opinion that an infection in one or more of the nasal accessory sinuses is the starting point of the disease. Such an assumption is supported by a determination of the etiology in a large number of cases. Birch-Hirschfeld[1], for instance, found that in 684 patients suffering from orbital inflammations, the sinuses were involved in 410 (60%). A recent investigation by Bourdon[2] led him to the conclusion that periorbital sinusitis was responsible for 83% of these inflammations.

The causes of orbital cellulitis other than sinusitis are stated by Heckel[3] to be: edema after injury, carious and infected teeth, osteomyelitis, meningitis, erysipelas, brain abscess, exanthematic and other febrile diseases, metastases

from distant foci, purulent inflammations and actinomycosis.

Foci of infective inflammation in various parts of the face have occasionally given rise to orbital thrombophlebitis or cavernous sinus thrombosis. Thus Haedo[4] reports a fatal case of thrombophlebitis of the cavernous sinus rapidly developing after the puncture (by the patient) of a stye. In a case cited by Filatow[5] a furuncle situated at the upper orbital margin was followed by bilateral edema of the lids, exophthalmus and unilateral chemosis. Pneumonia developed and death quickly supervened. Postmortem examination revealed thrombi in the cerebral sinuses, meningitis and abscess of the lung. The orbit showed phlebitis and periphlebitis, purulent thrombi and infiltration of the muscles.

Meyerhoff[6] cites four cases of orbital cellulitis due to staphylococcus infection, of which two were due to furuncles on the ala nasi (with fatal termination) and one followed furuncles on the forehead and cheek.

The examples cited are representative of a number of cases in the literature in which by direct extension or metastatic invasion purulent foci in the skin gave rise to orbital or cerebral sinus inflammation. Reasoning by analogy, it seemed probable that many cases of orbital inflammation should have arisen by direct extension of purulent inflammation from that very common furuncle, the stye. However, on examining the literature I was able to find no case that duplicated the one to be presented, and only three that resembled it.

CASE REPORT.

E. H., a physician, aged 27, entered St. Mary's Hospital at 10:00 p. m. January 10, 1925.

Ocular History: On January 5, 1925, a stye, located in the right lower lid near the outer angle, came to a head and was opened by the patient with a new gold hypodermic needle which was "flamed" before use. The lid continued painful and the following day (January 6) three more styes, in close proximity to the first appeared. January 7, the lower lid was much swollen and the styes showed a tendency to coalesce. At this time the upper lid became swollen. The patient consulted an oculist who used appropriate treatment (hot applications, etc.). January 8, it was noted that the globe was beginning to protrude, accompanied by deep boring pain and fever. On January 9 a "plug" was removed from the site of the original stye. He was urged to enter a hospital but temporized until the following evening.

Examination: The right eye was pushed forward to a level with the bridge of the nose and was completely splinted. The lower half of the bulbar conjunctiva was chemotic; vision, fingers at 5 ft.; ophthalmoscope: white edema of the retina, below, with very narrow arteries. The disc could not be seen. The inner half of the lower lid was occupied by coalescing hordeola; the outer angle presented a necrotic mass which included the outer third of the lower lid, the skin at the outer angle and the conjunctiva of the globe and lid at this site.

The patient was immediately sent to the operating room. Under ethylene gas, several pus pockets on the lower inner lid margin were evacuated by incision and curettage. The necrotic area at the outer angle was explored and it was found that it led into the orbit fully 4 cm. This pocket was enlarged by blunt dissection and considerable necrotic material and a few drops of thick pus were spooned and curetted out. A free canthotomy was done. A 1.5 cm. incision was made into the orbit extending from near the outer angle upward and inward and 5 mm. below the eyebrow. A similar incision was made through the lower lid into the orbit. Rubber tissue drains were placed in these openings. Vaseline was smeared freely over the exposed cornea and a moist boric pack was applied. Cultures made from the orifice of the sinus and the depth of the orbit showed staphylococcus aureus.

The patient spent a restless night despite morphia and compound empirin tablets, and the condition the following afternoon was decidedly worse, with great pain and increased exophthalmus. The deep orbital drain was removed and the cavity irrigated, the fluid re-

turning blood stained. Dr. W. T. Coughlin was called in consultation and advised very free incisions into the orbit through the upper and lower lids. Accordingly the patient was again anesthetized and a curvilinear incision was made entirely through the upper lid extending from the outer to the inner angle and about 1 cm. from the eyebrow. This incision was carried into the orbital fat on either side of the levator tendon but the latter and its fascia were carefully avoided. A similar incision was made through the lower lid into the orbital fat. Both incisions were packed wide open with rubber tissue stuffed with gauze. The drains inserted at the first operation were not disturbed.

After Treatment: Hot boric packs were applied almost continuously day and night. The eye was kept anointed with vaseline. Codein and empirin tablets were given freely for pain. During the early postoperative days the temperature did not rise above 100.6°, most of the time being well below 100° F. The wide orbital incisions oozed serum and blood, but at no time was pus observed. On the other hand, pus soon appeared at the opening of the sinus and there were points of great tenderness over the upper portion of the antrum and along the lower orbital margin. The right preauricular gland was enlarged. Vision dropped to perception of light. About a week later palpation in the mouth at the outer gingival border revealed bulging and tenderness.

Improvement was slow and the exophthalmus did not begin noticeably to recede until January 15. January 16, pressure over the right temporal region produced a free flow of pus from the sinus. On January 18, I gave a subscapular injection of 2 c. c. of sterile defatted milk. This was followed by a slight rise in temperature (to 101.4° F.). Three days later 6 c.c. were given. I could not convince myself that the slightest good came from these milk injections.

January 23. A full blown stye was observed near the inner angle of the left eye. This was promptly opened and subsided without further trouble.

Medical History and Examination: Always healthy. Tonsillectomy in 1920. Venereal disease denied. The general examination was negative. Urine, at the first examination was negative for albumin and sugar, but showed acetone. On one subsequent examination a trace of sugar was found in the urine. He was regarded as a diabetic by Drs. Kinsella and Briggs, and 25 units of insulin were given. Blood examination on January 11 and 12 showed moderate leucocytosis (15,000, 13,000 and 14,200). R.B.C. 4,150,000; hemoglobin 80%; polymorphonuclears 78%; lymphocytes 20%; transitionals 2%. Blood sugar (January 12) 143 mgs. per 100 c. c. blood; January 22—100 mgs. per 100 c. c. blood. Blood Wassermann, negative. Blood pressure, 140-85.

Nasal examination (Dr. I. D. Kelley) showed a slight amount of pus in the anterior nares; a deflection of the nasal septum to the right with a spur posteriorly extending from the septum to the lateral wall. Postnasal examination showed no pus from the posterior nares or sphenoethmoidal fissure. The examination did not suggest sinus infection and the X-ray examination was also negative.

The patient was discharged from the hospital February 3, 1925.

Since the patient left the hospital, the globe has regained full motility. Thanks to the precaution taken at the time of operation to avoid injury to the levator, the upper lid lifts perfectly. There is still a trace of exophthalmus. The nervehead is porcelain white, the retinal arteries are reduced to mere threads and some are completely obliterated, being represented merely by white lines. The retinal veins are slightly narrowed and are not tortuous. There are no retinal hemorrhages. Vision = light perception.

April 20, 1925. There persists a sinus at the outer angle which extends downward to the orbital rim and outward in the direction of the malar bone. On two occasions spicules of bone have been cast off, one of which was a fragment from the outer border of the orbit.

The ophthalmoscopic picture, both during the height of the cellulitis and subsequently, suggested embolus of the central artery. I am inclined to agree with Arnold Knapp[7] that in these cases there occurs an inflammation of the central artery of the retina—an acute arteritis. He says "without an anatomic examination this question can not be decided. The process in the artery is sufficient to not only shut off the blood current, but subsequently leads to a proliferation of the empty arteries, as is shown by the white glistening lines which are not present, or not so marked, in the picture of the noninfectious embolism or thrombosis of the retinal artery."

In cases of this character, I am convinced of the value, indeed of the necessity, of the widest curvilinear incisions parallel to the eyebrow and the ciliary border below; these must go thru all fascial planes down to the orbital fat. If care be taken to spare the levator (ample access to the orbit may be secured by wide incisions to either side of this muscle) there will be no interference with the subsequent motility of the upper lid. No such precaution need be taken in making the incision thru the lower lid; the only structure that might conceivably be injured is the inferior oblique muscle, and the incision will ordinarily be made below the level of its origin and insertion.

The purpose of these wide incisions, which must be kept open by rubber tissue tampons, is to reverse the current of the fluid products of inflammation. The outward flow should be further promoted by hot boric or bichlorid compresses, kept up almost continuously day and night. It is my impression that in dealing with orbital cellulitis, ophthalmologists are inclined to make rather narrow punctures, such as would result from thrusting a Graefe knife deep into the orbit. Such incisions can be justified only in cases in which a pocket of pus has been definitely localized, and the incision is made directly into this pocket. When the cellulitis is diffuse or there is no certainty as to the location of pus pockets, the incisions should be as wide as the width of the lids and should be kept open by means of the measures suggested or similar ones.

A case resembling the foregoing in some respects, but of a much milder type, is reported by Birch-Hirschfeld[8]. His patient was a woman, aged 60, who developed a stye at the temporal orbital margin. The eye proptosed, with indubitable signs of orbital cellulitis. Incision into the orbit at the temporal border yielded only a few drops of pus. A suction cup (Bier's hyperemia) was applied to the wound fifteen minutes twice a day. Rapid improvement and eventual cure, with normal eyeground and no impairment of vision.

Reis[9] reports an orbital phlegmon which had its origin from a pustule in the upper lid.

Despret[10] reports the following case: a stye, which had been progressing normally for several days, suddenly became violently inflamed with severe general symptoms. The eyeball became fixed, there were four small ulcerations at the limbus and the preauricular gland was enlarged. Longitudinal incisions and stock vaccines improved the condition.

Metropolitan Building.

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THE LIGHT SENSE: ITS IMPORTANCE AND TESTS.

H. G. MERRILL, M.D., and L. W. OAKS, M.D.

PROVO, UTAH.

This paper briefly sets forth the main facts regarding the light sense, and their theoretic explanation in relation to the histology of the retina. The important practical significance of this function is stated, and the simple methods for testing it. Read before the Pacific Coast Oto-Ophthalmological Society, June 20, 1925.

First we must get clearly in our minds the difference between the form sense referred to as acuity of vision and the light sense. The former is represented at its maximum in the fovea and functions only in proper illumination. It resides in the cones which are centrally located in the retina and not in the rods which are placed peripherally. When the eye becomes adapted to darkness, or scotopic, the two outstanding functions of the cones—the form sense and the color sense—become inactive.

The first thirty to forty minutes of dark adaptation is a rapid process and is all we need for practical purposes, altho it goes on at a decreasing rate for some time after that. As scotopia progresses and the cones cease to function, ability to distinguish colors wanes until the eye becomes totally color blind—the phenomenon of Purkinje. The order of disappearance, red, green, yellow and blue, suggests to us that the catabolic changes in the photochemical color substances of the retina, described by Hering in his color theory, require a greater light stimulus than the anabolic changes.

The threshold is higher for red than green and higher for yellow than blue. Combinations of these four primary colors follow the same order as their component parts. Can anyone suggest why the color sense extending most peripherally in the retina—yellow and blue—is last to go? Be that as it may, the centrally located fovea becomes not only color blind, as scotopia progresses, but also form blind; becomes indeed a blind spot in the scotopic or dark adapted eye.

The light sense which resides in the rods, including rhodopsin or visual purple so intimately associated with the rods, is quite another matter. With it we recognize different luminous intensities. It is not so highly specialized as the color sense, or the form sense, and therefore it persists longer under adverse circumstances — as things primitive always do. It is the protective vision remaining in a case of amblyopia ex anopsia. This light sense has been taken too little into account; especially so in our railroad and industrial examinations. An eye may have a visual acuity of 20/20 in daylight but fail miserably when darkness supervenes. This element of danger, particularly with railroad men, aviators and mariners is sufficient reason for our calling this matter to your attention. These cases should be weeded out by our routine examinations. Ophthalmologists must be reminded frequently, else they neglect to incorporate into the daily office routine even well known essentials.

Children at birth possess only this primitive light sense. It resides in the bacillary layer of the retina and therefore is monocular only. Indeed it remains monocular always, tho the infant in its development acquires what we know as fusion. The form sense and the color sense—functioning thru the cones—are perhaps established before the sixth month. A practical point is not to try to test for the presence of vision in an infant with the fingers or hand or other like object, because form sense is not present, but to use a light only. If there is vision, a light will cause the infant being so tested to fix. The form sense is at maximum in the fovea, and is somewhat but not markedly improved by binocular vision while the light sense is at maximum about ten degrees outside the fovea; and, being exclusively a retinal function, is greatly improved—is doubled in fact—by the simultaneous use of both eyes. The acuteness of form sense, at least above an angle 1′, is not increased by stimulating a greater area of the retina, while the activity of the

light sense is enhanced proportionately to the square root of the retinal area stimulated. This summation of stimuli is characteristic of the light sense.

There are two measurements of the light sense, each with its own significance. The least amount of light perceptible against a black background is known as the light minimum. Ordinarily a scotopic or dark adapted eye is used in the measurement; altho, as we shall see later, Percival has devised a test which may be used in ordinary daylight with the light adapted, or photopic eye.

While the ratio remains fairly constant, the dark adaptation lowers the light threshold of the retina—in other words the light minimum—by thirty-five times. For convenience we all speak of this threshold or light minimum as the L. M. It resides solely in the rods and their product rhodopsin.

The pathologic conditions which diminish the L. M. are those which affect the rods of the retina and also the choroid, upon which they largely depend for sustenance; such for example as retinitis pigmentosa, luetic retinitis, retinal degeneration without pigmentation, and hereditary nyctalopia. We have one case of total color blindness who shows a marked lowering of the light sense, both as to light minimum and light difference, altho his form sense in proper illumination is acute. This patient is not inconvenienced by auto lights, the glare of which would be almost blinding to a normal individual. It is, however, our belief that this high threshold for light sense is not dependent upon the absence of color sense.

The least difference in luminosity perceptible, that addition of light which just effects a perceptible change, is known as the light difference; the L. D. Normally this is about a one per cent increase in luminosity. As more than this is required the L. D. is said to be decreased; little or much as the case may be. Practically a decrease of the L. D. means trouble, not in the perceptive elements of the retina as was true with the L. M., but in the conductive elements of the retina.

An affection of the choroid, or of the deep layers of the retina, decreases the L. M. while trouble in the superficial layers of the retina, or in the optic nerve fibers, decreases the L. D. Late glaucoma does this; retrobulbar neuritis markedly lowers the L. D., as does toxic amblyopia, senile atrophy, or any optic atrophy. Errors of refraction make little or no difference in the light sense unless the eye is diseased. High myopes with considerable stretching of the eye coats adapt slowly to light or dark. Age is not a factor except where senile changes supervene as already mentioned. Strychnin and pilocarpin hasten adaptation while atropin retards it. This is noticeable in the production of scotopia but the light sense *per se* is not affected.

As might be expected in scotopia, where vision depends on the light sense, one sees best by looking not directly at an object but somewhat to the side. While this sense functions best some ten degrees outside the fovea, it is active thruout the whole periphery. It determines the alertness, the quickness of vision. Individuals differ greatly in their cultivation of this sense. In our country, the West, hunters learn to pick out a distant moving object with almost incredible alacrity. They have cultivated the light sense. It is primitive but of the utmost importance.

With one exception night prowling animals possess a superabundance of rods. This exception is the nocturnal tortoise whose olfactory sense seems to have superseded its vision. Diurnal lizards possess only cones; nocturnal lizards only rods. With the bleaching of the rhodopsin in any retina, the light sense rapidly decreases.

It is true that early glaucoma affects the L. M., because the deep bacillary layer of the retina is more susceptible to gentle pressure than the conducting fibers, but later in glaucoma the L. D. is markedly lowered. In this disease some men have come to rely upon the light sense tests as much as they do upon a tonometric reading. Where the media are hazy,

as in early cataract, a careful light sense study gives most valuable information as to the retinal elements, both perceptive and conductive.

And how shall we make these tests? Ferree has standardized a lamp with a rheostat which will measure both the L. M. and the L. D. This must be used after dark adaptation of at least half an hour. Less accurate but practical deductions may be made by attaching a rheostat to the illuminating device of the test chart; the opthalmologist comparing the light sense of his patient with his own.

Percival's rotating discs, which I demonstrate to you today, should and will become popular, as they do not require the production of scotopia and are therefore time savers. To measure the L. M. black discs are used on which are white sectors in graded sizes. These discs are rapidly spun so that the white sectors produce the effect of light circles on a black background. The least amount of light perceptible on a black background is the retinal light threshold, or the L. M. Before getting this small instrument we constructed one which was attached to a sewing machine motor and was very satisfactory. It, too, is presented today. The small ones which meet every practical requirement for office use may be procured from James W. Reeve, Surgical Instruments, Salt Lake City.

For the L. D. tests white discs with black sectors are used, producing the effect of gray circles; so that the differences between the white disc and the faintest gray circle measures the L. D. of the case tested. The L. D. is the smallest difference that can be detected in luminosities of almost equal intensity; an addition as we have said of about one per cent in normal cases. The size of sectors is arranged by Percival so as to demonstrate either an L. M. or an L. D. of 12½, 25, 100-200; the disc with the larger sectors reading from center to periphery 12½, 25, and 50; that with the smaller sectors reading 50, 100, and 200. The repetition of the 50 is good as a control.

Experience with this instrument would indicate that the normal L. M. is 200, while the normal L. D. as tested by these discs is 100. The instrument has tremendous advantage in not requiring dark adaptation, its readings require only a moment, but this very advantage may militate somewhat against its accuracy. Use it always in good daylight. Make a routine of this test; and by it pick out the occasional case in which an exhaustive study is indicated and in which you are willing to resort to the long scotopic examination route.

NOTES, CASES, INSTRUMENTS

OPTICAL BENCH AND FITTINGS.

ALFRED COWAN, M. D.

PHILADELPHIA, PA.

An optical bench of some kind is indispensable for the performance of many optical experiments. A good optical bench for teaching must of necessity be so constructed that, while it enables accurate work to be done, it can be easily and quickly set up and at the same time be substantial enough to stand real hard usage. The ordinary stock equipments offered by dealers do not seem to answer these requirements, moreover, in very few of these can trial case lenses and accessories be easily used—a disadvantage and added expense where trial cases are always at hand.

The bench, B, was obtained from Carl Zeiss. It is made of triangular steel, one meter in length, with a groove along each side to allow the saddle-stands to be securely fixed. Removable bolts and nuts are supplied with the bench so that it may, if desired, be fastened to a table or other base; but its great weight makes this unnecessary and sometimes inconvenient. The saddle-stands, as shown at A, were also obtained from Zeiss. The modifications and carriers were made by Wall & Ochs, for whose kindness and interest the writer is very much indebted.

Each saddle-stand is provided with two set-screws, one to fix into the groove and hold it in position on the bench, and the other to hold the carrier. It is so formed that it will stand and may be lifted off the bench and placed on the table, a very necessary proceeding in some experiments.

As the bench is not scaled, we have had a white line etched at the center of one side of each saddle-stand, so that direct measurements can be made with a meter stick. Measuring by this method is easier than if the bench itself were ruled.

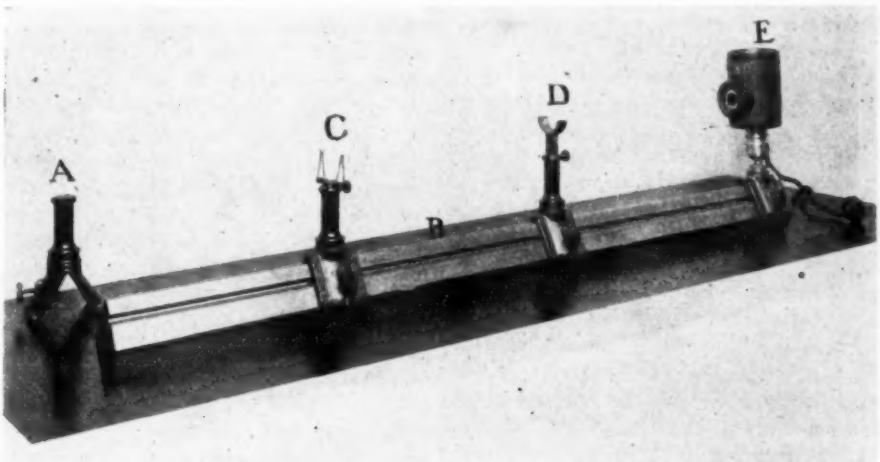

Fig. 1. Optical bench. A, Saddle stand; B, Bench; C, Carrier; D, Lens compartment; E, Lamp mounted on saddle stand.

It will be seen in the illustration that the saddle-stand at E has had the entire upper portion removed and a lamp socket, with switch and cord attachment, set in its place. This holds a round, frosted 25 watt lamp, housed in a Thorington chimney that is provided with an iris diaphragm. In front of the diaphragm opening there was placed a single trial lens cell of standard size.

The carrier in D is a three cell compartment to carry regulation trial case rings. It is set in a standard having a collar, so that when dropped into the saddle-stand and a lens placed in it, the lens will be exactly centered with the aperture in the chimney.

The stand C contains a carrier, consisting of two adjustable brass clips, mounted on a slotted cross-piece. The

upright, which fits easily into the saddle-stand, may be raised to the desired position and fixed by the set-screw in the stand. While this form of carrier can, when needed, be used for trial lenses, it is intended for holding screens, stops and other articles for which the cells in carrier D are unfitted.

The optical bench and fittings here described have been found extremely satisfactory for the use of students of practical optics in the Graduate School of Medicine of the University of Pennsylvania.

2007 Pine St.

TWO CASES OF RETINITIS PIGMENTOSA.

CLARENCE E. IDE, M.D., F.A.C.S.

LONG BEACH, CALIF.

CASE 1. July 14, 1920. Miss M. S., school teacher, age 37, complained that she could not see at night, had noted that she did not see at all in semi-darkness, when getting up at night had to light a match to get around. Had blurring of vision on reading.

She has worn glasses since age of 6. Had noted no special difficulty with vision until 15 months ago, while teaching. Has pain at glabella and is constantly conscious of a drawing sensation in the eyes. No family history of retinitis pigmentosa or poor vision.

Had measles before the age of 7. Mumps (unilateral) at 7, scarlatina at 12. A year ago had such severe pain in her eyes she could not use them for a time. Had operation for hemorrhoids 11 months ago, preceded by constipation. Has had many "colds." These begin with a raw dry feeling in the throat which extends to the nares. Colds not accompanied by headache, vertigo, eye pain or congestion of the conjunctiva. Had grippe a year ago. General health has always been fair, being able to accomplish much routine work if she keeps regular hours. Has slight leucorrhea, had more at one time. Had eczema of arms cured by application of an ointment. The stomach is her weak spot. If she eats when tired does not digest her food. Has always suffered from "car sickness," but is not otherwise subject to nausea and vomiting. Never could swing without vomiting.

Dental X-rays showed both upper third molars erupted, no lower buds. No evidence of sinusitis. Transillumination clear. Nasopharyngoscope reveals no pathology, tho there exists a deflection of the septum to the left at its base. Cranial nerves normal. No paresthesia or anesthesia. Thyroid normal in size. Pulse 72, blood pressure 138 S.

The ophthalmoscope shows the characteristic picture of retinitis pigmentosa, especially at the periphery and below, also healed retinal lesions along the superior nasal artery of R. Left fundus shows slight retinal edema (silvery sheen). Both nerveheads have indefinite outline, right shows fuzziness on its surface. The fields of vision for form are contracted down to from 40° to 60° in both eyes, the color fields (red, green, blue) are within from 10° to 15°, to 10° to 25° (Duane tangent scale). The pupils react to light and distance. Consensual pupillary reaction +. Hyoscin cycloplegia; retinoscopy, accepts R. + 3.25 Sph. = 6/10; L. + 4 ⌒ 0.50 cyl. ax. 90° = 6/10. Muscles: dist. Eso. 3°, L. H. 1/4°, near, Exo. 1°. Maddox prism and arrow test = 1.5° excess convergence. Final R: + 2.50; L. + 3 ⌒ + 0.50 cyl. ax 90°.

I feel that here is a case that would be benefitted by organotherapy.

CASE 2. Mr. F. C. H., attorney, age 32, complained of nasal obstruction. Had malaria 15 years ago, pneumonia about the same time. Is "bothered" with stomach. Has had retinitis pigmentosa since birth. One cousin has the same condition.

May 21, 1917, the writer did submucuous resection and adenoidectomy, with perfectly satisfactory result.

May 21, 1924. Complains of failure of vision and discomfort of eyes. Vision has been indistinct in bright light for the past 2 years. Still complains about his stomach. Is being treated for spastic colitis. Fluoroscope shows appendix filling and emptying.

Examination: Vision, R. = 6/20, L. = 6/30, without glasses. With glasses and using illuminated cabinet, R. = 6/10, L. = 6/15. B. E. = 6/9 (central).

Tension: (McLean) R. 29, L. 30. Ophthalmoscope: +20 shows nuclear lenticular opacity in both. Fundus shows characteristic picture of retinitis pigmentosa. Fields: Form down to tubular vision R. to 5°, L. to 5° to 10°. (Stereocampimeter.) The administration of endocrin extracts early in his life would doubtless have averted much of his pathology.

917 Security Bldg.

A SUCCESSFUL CORNEAL TRANSPLANT USING MESENTERY.

THEODORE KOPPANYI, Ph. D., and ALBERT H. BYFIELD, M.D.

Shown at Chicago Ophthalmological Society May 18, 1925.

For many years, attempts have been made to repair corneal defects. We are accustomed to associate such names as Hippel, Zirm, Ascher, Elschnig, Bonnefon, Sydney Walker, Jr., Wilder, and others with this subject. Of the tissues that have been used, cornea, skin of the lip (Wilder), etc., may be mentioned. It has also been noted that regeneration of the epithelium may take place in experimentally produced lesions. (Bonnefon.)

In the rabbit, which is being shown today, a strip of mesentery from another rabbit was used to cover a defect produced by dissecting a 3 mm. strip almost vertically over the approximate center of the cornea, extending from the upper to the lower margins thereof.

There was little that was unusual in the technic of the operation, which was done with ether anesthesia. The upper and lower ends of the graft were sutured with silk to denuded areas over the sclera. The operative procedure was made simpler by luxation of the globe. 1% mercurochrome was used both before and after the operation. On the fourth day, the lids, which had been sutured, were freed, and the graft was found to be in good condition, with very little clouding and no notable reaction in the adjacent portions of the cornea. In the weeks that have followed, there has been increasing clearness of the transplant, until now—two months and eighteen days since the operation—it is in the condition that you see it.

(Hull Physiological Laboratory, University of Chicago).

SOCIETY PROCEEDINGS

CHICAGO OPHTHALMOLOGICAL SOCIETY.

May 18, 1925.

CHARLES P. SMALL, M.D., President.

Operative Procedures for Glaucoma.

DR. H. W. WOODRUFF said that for about a year and a half he had been much interested in the operation of iridectomy for reduction of tension in various forms of glaucoma. The Society would possibly remember the first case operated upon by him with a new technic, which was shown about a year ago. Since that time he had operated thirty-nine cases of glaucoma of various forms—secondary glaucoma, acute inflammatory glaucoma, and the chronic simple variety. The cases were not selected, and the results were not always satisfactory, but in chronic simple glaucoma, operated in the manner advocated by Dr. Török of New York, the results were so gratifying that this technic ought to be given publicity. In the series of thirty-nine cases, twenty were of the chronic simple variety—that is, there were no congestive symptoms.

Heretofore it had been the general opinion that iridectomy offered very little as a curative agent. If a reduction of tension was secured, it was due to good luck, the result being brought about by the formation of a cystoid cicatrix. However, in this series of twenty cases of chronic simple glau-

coma, reduction in tension had been secured, down to 20, and even as low as 11 mm., in every case; with the exception of one, which was lost from choroidal hemorrhage. Two of the cases were shown, one of which had been shown a year and a half previously, and in this case the tension has remained well within normal limits, vision 20/20, which it was at the time of operation, the fields enlarged. He was satisfied that this case could be placed within the cured class. The other patient had been operated only a few weeks previously, but the tension was reduced from 54 to 20. Elliot's opinion was that three months was a sufficient length of time to judge as to the permanence of the results in glaucoma. This being true, the results stated in the twenty cases cited were not premature.

With several cases of secondary glaucoma, which simulates the chronic simple variety, equally good results had been secured, but the other forms of the disease did not seem to be benefited, and in the chronic congestive forms it had been necessary to enucleate three eyes.

The reduction of tension may be due to opening of the Fontana spaces and access to the canal of Schlemm, or to external drainage. In fact, in some cases external drainage was clearly visible to the naked eye—exactly the same appearance as Elliot' s trephining operation. The case shown had no sign of external drainage, therefore the results were due to the opening of the Fontana spaces and the canal of Schlemm, and not to the formation of a cystoid cicatrix.

The technic of this operation consisted in placing the incision as far back as possible, so that the line of incision made by the cataract knife followed as closely as possible the plane of the iris; if feasible, the point of the knife went actually into the angle of the anterior chamber, and as close to the root of the iris as possible. Then the point of a spatula was used to separate the iris and ciliary body from the sclera, the iris being drawn downward and outward by grasping with the iris forceps placed parallel to the wound, instead of vertical, so there could be no question about getting to the root of the iris, if it were at all possible to do so. It was of no particular importance whether or not the pupillary border of the iris was removed. In one of the cases shown the sphincter of the iris was intact. The main point was to grasp the root of the iris.

Dr. E. K. Findlay observed that each of the many and varied operations for glaucoma had its list of successes and also its failures. In acute glaucoma with high tension, the operative procedure should be governed by the character of the case, tho in the majority a broad iridectomy would give the best results. In subacute and simple glaucoma, the choice of operation presented more difficulties. The primary effort of the physician was to save what vision the patient possessed in the safest manner. Dr. Woodruff's results from the deep iridectomy were excellent, and the cases shown demonstrated that in his hands the operation was unquestionably successful. However, this was not a simple operation, and with a less skillful operator many accidents might happen. Personally, his best results had been obtained from the Elliot trephine. With careful technic, accidents were rare. There was no sudden gush of aqueous, the lowering of the tension was more gradual, and the low grade of iritis which followed could be safely combated.

Dr. Michael Goldenburg stated that in the eight years that he had been doing the iridotasis operation, he had yet to record a single complete failure. Just how many he had done during that time it would be hard to say offhand, but those familiar with the material available at the Eye and Ear Infirmary could well visualize the possibilities. The impressive feature about this operation, in his opinion, was the simplicity of technic and the apparent rapid and prolonged relief of the increased intraocular pressure. Altho the other decompression operations offered similar results, this one appeared more practical and more easily performed. The idea of compelling the aqueous humor to pass

from the anterior chamber directly into the subconjunctival spaces appealed to the operator as worthy of accomplishment. To attempt to reopen the natural channels of fluid escape, i.e. the meshwork and the canal of Schlemm, when they were once closed, appeared to be a hopeless task.

The peripheral iris synechia present in a case of glaucoma was the essential factor that maintained the elevated pressure, and might take in the entire circumference of the cornea, or be limited to only a part or parts. If the elevated pressure was marked and retained over a long period, it might be safely assumed that the peripheral iris synechiae were probably complete. If the tension was not marked, it might be said that these adhesions did not involve the entire circumference. However, there was no way of determining just what part of this circumference was involved. Any operation attempting to reopen the natural channels of exit was invariably in the region of 12 o'clock, so it would seem that the operative procedures were more or less haphazard and largely dependent on luck. What benefit was derived from the operation was probably the result of an involuntary incarceration of iris tissue, plus the functioning of the accessory channels of escape.

Microscopic study of a section of a glaucomatous eye revealed the periphery of the iris compressed and closely adherent to the posterior surface of the cornea. In early cases the iris was not so compressed, but in older cases there was a flat adhesion that would appear impossible of separation.

The technic of all decompression operations was based on the principle of ignoring the natural channels and attempting the formation of new passages of escape. Some operators accomplished this by removing a section of the sclera at the limbus, others by removing a button section of the corneosclera, and still others by incarcerating a tongue of conjunctiva or iris. The third method appeared to offer the best results. The six cases shown had all been operated by this method, the oldest being one operated seven years ago, with a retained vision of 20/25 in the affected eye, while the other eye had a vision of 8/200, having been iridectomized seven years previously, and presenting today all the appearance of a trephine operation.

Another case presented had had a diagnosis of intraocular tumor, and enucleation had been advised, but after close examination this diagnosis was rejected. Tension was 60 with the Schiötz tonometer, eye very painful and injected, the fundus could not be seen, transillumination was negative. An iridotasis operation was performed and the case made an uneventful recovery. About a week later, a fundus examination disclosed a large rounded black mass in the upper outer quadrant. The first thought was that the initial diagnosis of intraocular tumor had been correct, and that eventually the eye would have to be enucleated. The mass soon cleared up, however, and the case made a perfect recovery. It was thought that a detachment of the ciliary body had taken place; altho spoken of frequently as a detachment of the choroid, it was doubtful if a true detachment always took place. The choroid was attached to the sclera by connective tissue layers known as the lamina fusca, which on separation was found to tear—parts of it remaining attached to the two different coats.

The other cases presented had been operated during the latter part of last year and early the present year. In all, the results had been as satisfactory as could be hoped for. In only two cases were the results unsatisfactory—one a man of 80, with diabetes. The visual results were poor, but the tension and pain had been relieved. The glaucoma onset had been sudden and very severe and could not be relieved. Owing to the age and other conditions, it was necessary to operate under ethylene gas anesthesia, and the difficulty was thus increased on account of the operator's having to wear a gas mask. The patient refused after treatment, and as a result the pupillary area was filled with exudate.

In the other unsatisfactory case, a severe hemorrhage into the anterior chamber had taken place after the iris had been incarcerated. This was ap-

parently due to the giving away of the vessel walls of the iris as a result of the sudden reduction of tension. The spatula applied to the cornea indicated that the eye was again hard. The blood was milked out, but was replaced with more blood, and the eye was now soft. The case made an uneventful recovery, but recently the eye had become irritable, and it was believed that due to the severe hemorrhage some of the blood became organized and interfered with free drainage.

There had been much discussion concerning the case of suspected intraocular tumor. Dr. Gifford, at the meeting of the A. M. A., had suggested that this cyst like structure be transfixed, which had been tried with much benefit. Since that time, the procedure was adopted of making one or two small cuts in the iris after prolapsing it, which seemed to avoid the cystoid formation. According to the last edition of Fuchs, Critchett first performed this operation of iridotasis in 1857, and it would therefore appear that those credited with its origin had merely revived it.

Dr. Wilder had reported a case with the intense pressure of 80. Dr. Goldenburg had had several in his experience, where the eye was stony hard and enucleation seemed the only indication, but it was quite remarkable how well these cases did after an iridotasis operation. In fact, his opinion was that iridotasis offered the best results. He kept in frequent touch with a great many of his patients, and had seen no poor results other than the cases cited. The first iridotasis operations were tried with the idea of ascertaining whether drainage could be established and maintained. After four years these cases disclosed a tension that was below 25 in each case. It was not always possible to get the Infirmary patients to return for observation, some were too poor to come back, some went elsewhere, but a great many also came who had been operated by others. Dr. Wilder had suggested grasping the iris at the sphincter, but he had found it better to grasp it midway and thus avoid possible injury to the lens. The more simple the technic used, the better the results.

Discussion. Dr. Oscar Dodd was very much impressed with the favorable results obtained by Dr. Woodruff. He cited a case he had had recently of simple glaucoma in both eyes. In one eye the sight was gone; in the other it was failing and the tension was high. A Török iridectomy on the blind eye had been followed by a very good result. As the patient was unruly, this operation was not attempted on the other eye, but a trephine operation was done. The use of the spatula to separate the base of the iris from the cornea and open the canal of Schlemm was difficult, and there was a question whether in a case which had lasted for some time there might not be danger of tearing thru the iris instead of separating it. His experience with iridotasis was limited to one case done in the clinic. The immediate result was good, but the patient returned in a few months with increased tension and a large hard tumor at the site of the incarceration of the iris. The conjunctiva was dissected away and the tumor removed, which proved to be a thick walled cyst lined with the prolapsed iris. After the iris margins were replaced, the wound healed readily and the tension remained normal. A similar case had been reported in the Archives by Dr. Verhoeff of Boston, with a pathologic report of the enucleated eye.

Dr. Harry S. Gradle thought it would be interesting if Dr. Woodruff would cite some of the cases of glaucoma simplex in which he had had such success. No operation gave uniformly good results. There were two types of the disease, malignant and simple in form, and regardless of what was done, the malignant type could not be checked, while the milder form could be controlled to a great extent by miotics. No doubt Dr. Woodruff had operated both types, and it would be interesting to know how long these patients were carried along with miotics before operation was resorted to, and what the indications for operation were. Personally he had had no experience with iridotasis, but when Dr. Wilder spoke so highly of it there

must be a great deal of merit in this procedure. He had, however, seen four cases at the County Hospital upon whom iridotasis had been done at the Infirmary, and the eyes were stone hard and stone blind.

Glaucomatous Excavation of Nerve-head and Arc Scotoma, Without Hypertension.

DR. HALLARD BEARD presented for himself and DR. E. V. L. BROWN, a woman, about fifty years of age, who had been seen first at the clinic of the University of Illinois some six months previous. She gave a history which in no way suggested glaucoma, and it was only by accident, during routine examination of the eyegrounds, that the discovery of complete glaucomatous cupping of the discs in each eye was made. Investigation of the visual fields disclosed that they were contracted some 20 to 30 degrees in all quadrants, and, by means of the Lloyd stereocampimeter, it was possible to plot the arcurate scotoma shown in the charts which were passed around. Tension, however, was within normal limits, i.e., 18 in each eye, and with the anticipation of a fall of tension when a miotic was used, the pupils were contracted to 1 mm. with eserin. A second reading of tension, one hour later, showed no change in the reading of the Schiötz tonometer. The following day the pupils were dilated cautiously with homatropin, and tension again tested with the tonometer. No increase could be demonstrated, and refraction was done, bringing the vision of each eye to about 20/25; at the time of admission vision in each eye had been 20/40. Not yet completely satisfied that the patient's eyes were not potentially glaucomatous, it was decided to hazard the instillation of atropin to dilate the pupils for a period of several days, and another tonometer reading about a week later still showed no increase in tension. At no time since had it been possible to demonstrate hypertension in either eye, altho mydriatics had been used frequently. Details as to refraction and a sketch of the eyegrounds could be seen by reference to the patient's record, which was available.

Cases Illustrating Eye Lesions of Cerebral Syphilis, and Endocrine Gland Diseases.

Status Lymphaticus and Proptosis.

DR. GEORGE F. SUKER presented Mr. K. aet 29. Marked bilateral proptosis for past several years—left more so than right. On several occasions the left globe was dislocated from the socket. This occurred when he stooped, strained or lifted heavy objects. The right globe was dislocated once. He could readily replace them. Upon pressure both globes were quite easily replaced. There was a small flame shaped retinal hemorrhage in the left eye, with a moderate retinitis proliferans, veins in both fundi full and rather tortuous, vision 20/20 in each eye. X-ray of skull was negative. X-ray of chest showed a very large mediastinal space, persistent thymus, and heart displaced two inches to the left. Both infraorbital margins and maxillae were rather undeveloped. Several X-ray exposures were made to the thymus, the diet regulated, and mercury and potas. iodid given in rather large doses. Since then the eyes have receded considerably. No doubt that he has a marked status lymphaticus.

Complicated Gonorrheal Ophthalmia.

DR. SUKER presented Master G., now aet 9. Had bilateral gonorrheal ophthalmia with a central perforation of the left cornea, and sloughing of the right cornea, in his second week of life. The right eye was enucleated, and a conjunctival flap saved the left eye. When six weeks old, an optical iridectomy was made in the left eye. Tho there still remained an anterior polar cataract and nystagmus in the left eye; the optical iridectomy had given him sufficient vision to attend regular school classes, having attained the fourth grade. The conjunctival flap was made in the presence of an actively discharging conjunctiva.

Ocular Syphilis.

DR. SUKER showed four cases of acquired syphilis, each showing the peculiar peripheral chorioretinal pigment changes so characteristic of syphilis, without any disturbance of

visual acuity or other pathologic findings in the fundi. At the County Hospital, a careful search for these pigment changes was routinely made in all syphilitics who entered the ophthalmic ward. The pigment changes were between the snuff, tobacco and powder grain types, and first appeared in the periphery, gradually encroaching upon the macular and disc areas as time went on. So far no pathology followed in their wake.

Eye Complication of Leprosy.

DR. FORREST J. PINKERTON (Honolulu) read this paper.

A Successful Corneal Transplant Using Mesentery.

DR. THEODORE KOPPANYI showed a rabbit where such a transplant had been used. (See p. 43).

THE KANSAS CITY EYE, NOSE THROAT SOCIETY.

September 24, 1925.

DR. J. W. MAY, Presiding.

Hemorrhagic Glaucoma.

DR. HUGH MILLER reported a case which he had diagnosed and treated as acute iritis, but which in ten days showed a marked increase in tension with much blood in the anterior chamber. The other eye had been removed eight years previously. He later felt that the eye he was reporting probably had hemorrhagic glaucoma from the start. At the first examination finger palpation had shown no tension increase; but there was a circumcorneal injection, small pupil, tenderness and loss of vision. The pupil could not be dilated by the use of atropin and dionin. There was great pain. The atropin was stopped and eserin used and later scleral puncture relieved the pain. The loss of vision did not clear up. If glaucoma was there from the start, the failure of the pupil to dilate might be caused by an atrophy of the iris.

Discussion. DR. J. W. KIMBERLIN believed that from the description given the case was undoubtedly one of acute iritis; and that the tension came as a result of the occluded pupil and the hemorrhage from the iris.

DR. MCALESTER mentioned Dr. Zeigler's advocacy of scleral puncture.

Ptosis in Diabetes.

DR. F. SHOEMAKER reported a case of monocular ptosis of probable diabetic origin. The patient had been suffering from an advanced diabetes and both eyes showed an extensive diabetic retinitis. The ptosis was almost complete and had existed two weeks before admission to the hospital in July 1925. There was an involvement of the sixth nerve, and other muscles controlled by the third, tho with no mydriasis. The vision O. D. 5/6, O. S. 5/15. He was in the hospital about 3 or 4 weeks. Under insulin and also iodides, there was some improvement in the ptosis, till by forcing he could elevate the lid enough to get some vision out of the eye. He left the hospital against advice and the condition could not be followed further.

Discussion. DR. J. W. KIMBERLIN had seen this case in consultation and spoke of the rarity of diabetic ptosis. The accepted figures show 20 to 30% of eye disturbances in diabetes; and of these but about 4% are of the ocular muscles, and of these the sixth is more often involved than the third. Duane said in 1906 that the literature would show about a dozen reported cases of paralysis of the eye muscles in diabetes, and since then very few have been noted. In many of these cases lues cannot, of course, be entirely eliminated but the repeated Wassermanns failed to show it in this case.

Penetrating Wound of the Eyeball.

DR. E. S. CONNELL presented a case showing the after results of a severe penetrating wound of the globe in a youngster of five years. A sharp stick had made a linear cut in the cornea 2/3 of its diameter injuring the iris and lens. There had been hemorrhage and infection of the globe. Dr. Connell stressed the use of repeated foreign protein injections in these cases. The eye was practically quiet now with the tension somewhat reduced. Tho vision was gone he hoped the globe could be retained to prevent the resulting facial

asymmetry that would probably follow an enucleation in one so young.

Discussion. Dr. A. W. McAlester thought there was still some danger from the eye on account of the presence of some blood in the anterior chamber and felt the loss of orbital fat would be prevented if the ciliary ganglion was not severed in enucleation operations.

Dr. R. J. Curdy had seen few cases of real facial underdevelopment in early loss of the globe.

Tarsal Resection for Vernal Catarrh.

Dr. J. W. May showed a patient, a boy of 16 years, whom he had treated by various methods for the past several months for vernal conjunctivitis of the left eye, with little result until he had done a tarsal resection five months ago. It was of the cobble stone variety, and had given general irritative symptoms. The lid now shows a good external aspect, and conjunctival surface is smooth. Symptoms are much improved, and he is doing his school work in comfort. Dr. May defended the operation in this class of cases.

Discussion. Dr. A. W. McAlester said he had seen no bad results from the operation when carefully done. He advised it in trachoma, doing an external canthotomy in conjunction with a tarsectomy to relieve pressure.

Dr. Shoemaker reported having done a great many of the operations in trachoma among the Indians and others, with splendid results.

Iritis with Hemorrhage Following Neosalvarsan Administration.

Dr. J. Wallace Beil presented a case showing the after results of a severe hemorrhage into the anterior chamber after the injection of neosalvarsan and the resulting good vision notwithstanding a complete annular synechia and extensive exudates in both eyes. The vision is now O. D. 20/30, O. S. 20/40. Dr. Beil asked if others had experienced iris hemorrhage following the use of neosalvarsan in iritis. Dr. McAlester, in discussion, had seen none.

J. W. Kimberlin, M.D., Reporter.

COLLEGE OF PHYSICANS OF PHILADELPHIA.

Section on Ophthalmology.

April 16, 1925.

Pit of Optic Nervehead. Partial Coloboma.

Dr. J. S. Plumer (by invitation) exhibited a colored woman, aged 26 years, with congenital cupping of the papilla in right eye and partial coloboma in "pit" of papilla in left eye. Vision = 6/6 in each eye, with correction. Tension normal. In the right eye, the vessels emerged from beneath the overhanging margin of the cup above, to the nasal side, and below. The cup edges did not extend to disc margin as is noted in glaucoma, nor was arterial pulsation present. These conditions, according to Ball, characterize congenital cupping of the papilla. The remainder of the fundus was normal. The left eye revealed a deep vertically oval physiologic cup, sloping into a small dark gray pit at lower margin. The central vessels were displaced somewhat upwards. From the lower margin of the pit, there emerged a cilioretinal vein and also a leash of arteries and veins showing marked perivasculitis, the latter connected with the central vessels above by a small vessel running along the bottom of the cup and pit. The central vessels showed an anomalous arrangement. Otherwise the fundus appeared normal.

Fields taken three times, over a period of three months, showed in the right eye a slightly enlarged blind spot, but color and form fields normal. Left eye, upper nasal quadrant cup combined with Bjerrum scotoma due to involvement of inferotemporal fibers in the congenital disc defect (pit of papilla). According to Dimmer, pitting of the optic papilla consists of round or oval areas, dark gray to black or green-blue in color, situated almost always in the lower temporal half, rarely in the lower nasal half of the otherwise normal papilla. It varies in size from one-fourth to one-third the size of the papilla. The color according to Lindahl is due to shadows re-

sulting from the presence of semi-transparent tissue. According to Lauber, pit of the papilla is similar in nature to partial coloboma, on the basis of his findings histologically in one case. Some cases have emerging pit vessels; others, none. Variations in details of appearance and arrangement of vessels is common. The condition of partial coloboma or pitting of the papilla is of uncommon occurrence.

Discussion. Dr. Wm. Zentmayer stated that the presence of a cilio-retinal vessel emerging from the pit is interesting because some one has suggested that this anomaly may be atavistic. In some of the lower types the retina is supplied by the ciliary circulation, the vessels entering the eye in a similar way. That this anomaly is closely allied to a coloboma was shown by Lauber in the study he made of such an eye. He found an invagination of a typical retinal tissue filling the floor of the cavity.

Traumatic Retinal Lesion.

Dr. Warren S. Reese exhibited a case of retinitis in a man, aged 32 years, who complained of poor vision in the right eye due to a bursting shell and bromid gas in October, 1918. He stated that he had been studied carefully at Fort McHenry and Johns Hopkins hospitals several years ago for some systemic cause of his eye affection, but that nothing had been discovered. Externally, the eye was negative. The ophthalmoscope revealed a circular, yellowish, wreath like lesion, horizontally oval and about two d.d. in diameter, with a small red dot in the center. The disc was hyperemic, with blurred edges, and the vessels exhibited perivasculitis, especially to the temporal side near and beyond the lesion, where there were a number of rather small, tho variously sized pearly white and slightly refractile spots, usually arranged along the course of a vessel. In the lower periphery there were two rather large pigmented areas. Altho exhibited as a case of circinate retinitis, it is certainly not typical of this condition and was presented for diagnosis and comment.

Discussion. Dr. Wm. Zentmayer said that from cursory examination of the case the evidence of inflammation is more marked than one finds in circinate retinitis. There is undoubted subsiding papillitis. The belt has not the usual location, and the component parts are more glistening than is usually seen in circinate retinitis. The change at the macula appears to be also of a more inflammatory nature. It is possible that the injury he received to the eye explains the fundus picture. Another possibility is diabetes, as these changes are suggestive, and likewise a typical circinate condition is often found as a complication of diabetes.

Changes in Aqueous Under Influence of Certain Drugs.

Dr. Francis Heed Adler (by invitation) gave the results of studies of the aqueous humor under the influence of miotics and mydriatics. The protein content of aqueous humor, like cerebrospinal fluid, is quite low, approximately 0.03 per cent. In inflammatory diseases of the eye, particularly in those affecting the anterior segment, the protein content is increased. This is analogous to the increase in protein in the fluids filling serous cavities, as the pleural, pericardial, and peritoneal cavities, during inflammation. The blood vessles, normally impermeable to protein, under those conditions which characterize inflammation allow the protein molecules to pass thru their walls.

Studies on changes in protein content of aqueous humor under experimental conditions have been made by numerous investigators, but the methods employed have, for the most part, been too inexact for the measurement of such small changes. Thus the refractometric and micro-Esbach methods employed by Seidel and Wessely, respectively, were found to be totally unsatisfactory in the hands of the author. A nephelometric method devised by Dennis and Ayer for the quantitative estimation of protein in the cerebrospinal fluid was found to be far more accurate and was, therefore, used in carrying out the experiments described. A summary of the results obtained were: 1. Eserin increases the protein content when instilled into the

conjunctival cul-de-sac. Atropin causes no regular change, but instilled prior to the eserin, successfully prevents eserin from increasing the protein content. 2. Removal of the ciliary ganglion, resulting in degeneration of the third nerve fibers, causes a definite decrease in the protein content for which no explanation has as yet been found. In these experiments, eserin is still able to increase the protein content. It seems certain, therefore, that eserin, in increasing the protein content, does not act on the ciliary epithelium, as suggested by Seidel, but probably on the blood vessels directly. Full details of the methods used and experiments performed, are embodied in the complete article in the Archives of Ophthalmology, May, 1925.

Perforating Injury of the Ciliary Body.

Dr. H. Maxwell Langdon exhibited a case of perforating injury of the ciliary body, in a woman, aged 26 years, who was seen first on March 18, 1924, with a history that a small piece of china from a shattered cup had flown into her face, cutting the left upper lid and producing some blurring of vision. There was a wound of the left upper lid near its center about even with the tarsal cartilage and upper limbus of the globe; also a penetrating wound of the ciliary body and a small bead of vitreous showing at the mouth of the wound. The iris was quiet, the anterior portion of the vitreous contained some hemorrhage, but the rest of the media were clear, and the fundus normal. The X-ray gave no shadow of a foreign body but this was not conclusive evidence that nothing had entered the eye, since china is of the same penetrability as muscle and therefore in the body is not to be distinguished from it. The patient was put to bed, atropin and bandage applied, and in three days the lid wound had completely healed, and in two weeks the eye was quite white. Sodium iodid was continued for some months, the vitreous haze gradually cleared, except for some specks in the anterior portion, and vision returned to normal.

Perforating Injury of Globe.

Dr. Langdon also showed a case of perforating injury of the globe and foreign body in the orbit. The patient, a young man, aged 23 years, was seen first on January 30, 1922, with a history that he was struck in the right eye about one hour before by a piece of steel. Down and out there was a small conjunctival hemorrhage with a cut in the sclera thru the ciliary body, slight haze in the anterior portion of the vitreous up and out from the disc, and an area of choroidal disturbance about the size of the disc. X-ray examination showed a small foreign body in the orbit back of the optic nerve. A moderately severe iridocyclitis developed, which quieted down; but a granuloma formed at the site of the wound. At the present time, except for a small amount of vitreous haze and a scar in the choroid, the eye is normal.

Foreign Body in the Choroid.

Dr. Langdon also showed a case of foreign body in the choroid, in a young man into whose eye, about a year before, a foreign body had penetrated and lodged in the posterior portion of the choroid. The vision was normal and the eye quiet. When he was shown this Section, Dr. Sweet thought, since the man had normal vision, it might be better to allow the body to remain and possibly become encapsulated rather than attempt extraction which would probably fail. The man went to California, the eye became inflamed, and had to be removed by Dr. Frank, apparently uveitis developing with a certain amount of siderosis.

These cases are shown because they all are instructive. The first shows a wound of the ciliary body, a foreign body evidently penetrating into the vitreous but not passing thru the sclera, as no evidence of a foreign body can be seen at the present time, and in spite of this wound of the ciliary body the eye quieted down and is a perfectly useful organ. The second case shows how, by chance, the vital structures of the eye can be injured and yet no loss in vision occur, and the third that in all probability no foreign

body in the eye can ever be considered as unlikely to cause serious trouble, and that globes with foreign bodies in them even tho quiet and with good vision, will possibly be lost later.

Discussion. Dr. Wm. Zentmayer asked if there was a subconjunctival hemorrhage present in the case of double perforation? This symptom is said to be diagnostic of double perforation. In three of his cases he found it present in but one, so that the negative phase is inconclusive.

Osteosarcoma of the Orbit.

Dr. Wm. Zentmayer reported a case of a boy, aged 16, who presented an extreme degree of proptosis of the left eye with papillitis. Vision = L. P. There was firm resistance to replacement of the globe. No pulsation. No bruit. There was a palpable mass in the anterior portion of the orbit both inferior and superior. The X-ray, made by Dr. Pfahler, showed a marked enlargement of the eyeball. After a course of X-ray an exploratory incision was made along the floor of the orbit. Thru this a tumor could be felt below the optic nerve. Because of this an exenteration of the orbit was done. A dumbbell shaped dense mass, with the larger sphere above, was found to encircle the optic nerve. The whole tumor having distended the orbit in its growth, was larger than the external opening of the orbit, and it was necessary to crush it and pry it out. Following the operation, radium was applied within the orbital cavity. Granulation took place normally, and one year later there is no return of the growth.

The histologic study made by Dr. Case showed the growth to be an osteosarcoma of varying density, some portions showing a cartilaginous phase of ossification while others showed relatively hard bone. The sarcomatous element was of the spindle cell variety.

Dr. Zentmayer commented upon the difficulty of diagnosis in such cases, and said that in his experience palpation was often misleading. He cited several instances where distinct masses could be felt in the anterior part of the orbit when the growth was either in the accessory sinuses or well behind the globe. He believed these possibly to be due to the engorgement of the orbital veins, with edema, and possibly an increase or displacement of the orbital fat.

In answer to a question by Dr. Frederick Krause, Dr. Zentmayer said that examination of the nasal sinuses was made by Dr. Skillern and no extension of the neoplasm into these areas was found.

C. E. G. Shannon, Sec.

BALTIMORE MEDICAL SOCIETY.

Ophthalmological Section.

October 22, 1925.

Treatment of Sympathetic Ophthalmia.

Dr. Alan Woods reported on the results that he has obtained on treating cases of sympathetic ophthalmia with uveal pigment. 95 to 98% of the cases of sympathetic ophthalmia, he said, showed a skin hypersensitivity to uveal pigment. This finding was the basis upon which he had planned his therapy. He reported ten cases in which injections of pigment had been given and concluded that on the whole the use of pigment was distinctly beneficial. There is danger, he said, of focal reactions in the eye if the dosage is too large. The pigment therapy can be given along with any other form of therapy that is desired.

Dr. Woods stated that he believes that the results obtained by treatment lend some weight to the allergic theory of sympathetic ophthalmia. He felt that the action of the pigment cannot be likened to that of foreign protein therapy, for it was only when the dosage of pigment was kept small and all general and focal reactions were avoided, that decided improvement resulted. Dr. Woods summed up the evidence which is in favor of the allergic theory of sympathetic ophthalmia, but was extremely conservative in drawing any definite conclusions on the basis of this evidence.

Foreign Proteins and Ophthalmology.

Dr. Nathan B. Herman read a paper on foreign protein sensitivity

and its relation to ophthalmology. Dr. Herman dealt with the subject from the point of view of the internist, considering first the methods which are used in detecting foreign protein sensitivity. He discussed certain conjunctival and corneal conditions, especially vernal catarrh and pollen conjunctivitis, in which he regarded the evidence as decidedly suggestive in favor of an allergic basis. He had several cases of these types which seemed strikingly improved on desensitizing therapy. He next discussed the relation of phlyctenular disease to tuberculin sensitivity, which seems quite well established. He dealt only briefly with the sensitivity of the eye to uveal pigment, since this had been the subject of the previous paper, and he alluded to the recent work on allergic reactions to lens protein and their possible relation to cataract.

Discussion. Dr. Alan Woods stated that the whole field of allergic reactions and their relation to the eye seemed to him a particularly fascinating one, and one in which we were on the threshold of interesting discoveries. He alluded to recent work which tends to show that interstitial keratitis may be an allergic reaction.

Dr. W. H. Wilmer stated that he believed that pollen conjunctivitis and vernal catarrh should be very sharply differentiated, tho at times the conditions presented marked clinical resemblances. In vernal catarrh conjunctival smears show large numbers of eosinophils and also inclusion bodies, whereas inclusion bodies are not found in pollen conjunctivitis.

Extraction of Senile Cataract.

Dr. E. A. Knorr read a paper on the results of one hundred consecutive cases of extraction of senile cataracts. Among the complications which had occurred were one case of suppuration and two cases of expulsive hemorrhage. Most of the operations he had performed were iridectomy and capsulotomy. In about one-fourth of the cases the lens had been extracted in capsule by the Knapp method, but the results by this method were not as good as those obtained by extraction with capsulotomy.

Dr. Jonas S. Friedenwald demonstrated sections of a series of cases of intra- and extraocular tumors.

Jonas S. Friedenwald, Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON.

Section of Ophthalmology.

Friday, October 9th.

Sir Arnold Lawson, Presiding.

Corneal Pigmented Spindles.

Mr. J. D. M. Cardwell showed a single woman, aged 30, with this condition. There was no family history of myopia, nor of any previous inflammation of the eyes. Her corneae presented vertical spindle shaped pigmentation, symmetrically arranged in each eye, situated below the horizontal meridian, and of an area of 1½ x 3 mm. The pupils reacted normally to light; the iris was gray, and showed no evidence of past inflammation, nor were there signs of persistent pupillary membrane. The left, the more highly myopic eye, showed an area of choroidal atrophy at the outer side of the disc. Refraction of the right eye was minus 10 D., and of the left minus 20 D. Miss Ida Mann, after examination with the slit lamp, located the pigment as in the posterior layers of the cornea, and said they were composed of a multitude of closely set brown rings.

Mr. Cardell said that a complete review of several cases by T. B. Holloway appeared in the "Annals of Ophthalmology" 1910; the speaker gave the meeting a classification of those nine cases. Some difference of opinion existed as to whether the condition was congenital, or acquired. In support of the former view Thomson and Ballantyne said that there was the perfect symmetry, the pigment spots being of the same size, the fact that the pigment was interstitial and not on either surface of the cornea, there being no past history of inflammation, and the eyes being myopic. Vogt, however, considered the condition to be acquired.

Discussion. Mr. J. Gray Clegg said he had a case of the condition, in which

there was pigment in both eyes. At first he thought the distribution of the pigment was due to his having slept on his left side, but he found that he was in the habit of sleeping on his right.

Penetrating Wounds of Eye.

MR. G. H. POOLEY (Sheffield) showed two cases of penetrating wound of the globe. The first patient was cutting his hedge, when a thorn came back sharply and penetrated the outer side of the left cornea, and entered the ciliary body. An attempt had been made locally to remove the thorn, but it was unsuccessful, as the thorn broke off short. A few days later the eye became septic, and a hypopyon filled the whole lower half of the anterior chamber. Mr. Pooley excised the whole of the septic area, including a piece of sclera, and washed out the wound in the globe with 1 in 1,000 acriflavin, in normal saline, and the whole condition disappeared. He put three catgut sutures into the sclera, invaginating the edges, and cut away a piece of conjunctiva on one side, and brought a conjunctival flap over, which he sutured with catgut. Recovery was satisfactory; there was no keratitis punctata, vision 6/12.

MR. R. LINDSAY REA mentioned a case of penetrating injury of the eyeball caused by a piece of china from a broken plate. A week afterwards, when he saw the case, the cornea was penetrated, and in the wound he saw iris and a large piece of the anterior capsule. A marked hypopyon was present, and there was no reflex from the vitreous. Dr. Batten advised holding his hand before operating, and he did so, taking skiagrams from two angles, but they were negative. The patient lay in bed and careful bathing of the eye was carried out, and during that the hypopyon disappeared, he was able to divide the piece of capsule, and the vitreous began to clear up. The lens had not become opaque. The vision of that eye was now 6/18, that of its fellow being 6/12.

Discussion. MR. J. GRAY CLEGG (Manchester) initiated a discussion on penetrating injuries of the eye, his attempt being not to range over the different varieties of perforating injuries and their treatment, but to deal with some practical and interesting points.

During his 25 years at the Manchester Royal Eye Hospital, nearly 213,000 cases of accident had been treated, and 1,448 of those had been in-patients under his care. There were among them 859 cases of penetration or rupture of the globe. The fullest possible history of cases of penetrating wounds should be obtained, and it must be determined whether complete penetration has taken place, and whether the mechanical agent has been withdrawn, or still remains in the eye. When examination by ordinary methods failed, perforation could often be proved by means of the slit lamp.

First as to the cornea. If the wound of it be small and aseptic, no active surgical treatment is required. If the iris is prolapsed or caught in the deeper part of the wound, the foreign body should not be regarded as retained. If there is no such prolapse there is a greater probability that the foreign substance is still in the eyeball.

For prolapsed iris one can do either (1) reposition thru the wound (often unsuccessful); (2) reposition by making a small corneal incision with a keratome at a point 180 degrees from the wound and passing in an iris repositor or blunt hook, and separating the iris from the cornea by traction; (3) excision of the prolapsed portion, which is the usual method he had followed. If the decision is to excise the prolapse, he advocated, in suitable cases, the use of small, fine ribbed capsule forceps, especially when the iris has become friable owing to inflammatory changes a few days after the accident.

When the corneal wound was large and tended to gape he favored suturing the cornea, using Webster Fox's slitring forceps. Horeshair or the finest silkworm gut were the suture materials he recommended. In some cases it was an advantage to raise the conjunctiva at the corneal limbus, undermine it for some distance, and so suture it that the wound was well covered. For ragged and irregular wounds a conjunctival covering was

desirable and for this he suggested the Nuel suture. He discussed the disadvantage of suturing the conjunctiva over the wound. When there has been a delay of several days before the ophthalmic surgeon is consulted Mr. Clegg said that immediate operation was sometimes needed, but each case must be decided on its merits. If iris was prolapsed or adherent to the corneal scar, if in two or three weeks the eye was quiet, in most cases operative interference should be undertaken to relieve dragging. This could be done by one of three methods: (a) an iridectomy at a position diametrically opposite the site of the wound, (b) an iridectomy at either side of the anterior synechia, (c) complete severance of the attached portion from the rest of the iris, with or without partial iridectomy.

Mr. Clegg next discussed the question how far it was safe to leave a traumatically produced anterior synechia in a quiet eye months after an accident. Mere perforations or clean cuts were left to recover as best they could. Wounds of the lens, associated with penetration of the globe, always complicated matters if there was anything more than a fine tear in the capsule not large enough to allow aqueous to invade the substance.

With regard to the question as to whether it was advisable to remove lens substance when there was a recent wound of the cornea, he thought extraction (when there was a hard nucleus), or expression thru the original wound, or lavage, or suction of the soft cortex should be done when there was extensive rupture of the capsule, as the presence of lens substance in the anterior chamber increased the possibility of sepsis, diminished the osmosis at the filtration angle, and might even lead to endophthalmitis phakoanaphylactica. But when the corneal wound was not large and the lens substance not greatly swollen, the removal of the lens could be left to absorption in a young subject, or to a later extraction in a person over 30 years of age.

If vitreous protruded into the anterior chamber, little could be actively done except when it prolapsed thru the corneal wound. The prolapse should be snipped off and the eye protected against infection.

When the wound was at the corneoscleral junction or in the sclera, the case was more serious, but there was no longer fear of the "danger zone." If ciliary body or choroid were prolapsed it could only be excised. Even large clean wounds of the sclera might heal well, and a useful eye be retained. Covering with conjunctiva was desirable in all cases, and the edges of the sclera could be brought into contact by Nuel's suture; it was rarely necessary to pass the suture material thru the whole thickness of the scleral tissues. One late effect of even the cleanest wounds of the sclera might be detachment of the retina, and the question was, could anything be done to prevent this? If wounds of the sclera were of some days or even weeks standing, questions arose other than those connected with the wound itself. In all extensive perforating wounds of the globe it was necessary to consider whether recovery was possible with the retention of a globe which would have useful sight and would yet not be a threat to the fellow eye. It was, he thought, rarely wise to condemn an eye to evisceration, or excision, as soon as it was seen to have suffered. At least a week should be allowed to pass before condemnation was pronounced, and there was practically no fear of sympathetic trouble during that short time. He asked the opinions of members as to whether any good resulted if an exciting eye was removed when sympathetic disease had already started in the other eye.

With regard to foreign bodies, penetrating and remaining in the globe, these were divisible into magnetic and nonmagnetic and both could be classified into radioopaque and radiotransparent. The first named could be accurately localized by the methods of Mackenzie, Davidson or Sweet. Sometimes the foreign body could be seen on focal illumination by the ophthalmoscope, or it was evident on transillumination. If a nonmagnetic substance, such as glass, was causing no

obvious irritation it could sometimes be safely left. Chemically irritating substances, such as copper, eventually led to loss of the globe, hence every possible effort at removal of such materials must be made. Magnetic substances were best removed, by the magnet, for siderosis and opacity of lens might otherwise ensue. If the iron or steel fragment were in the anterior chamber, or even in the iris tissue, or in a wounded lens, it could usually be extracted thru the original wound, tho sometimes this wound had to be enlarged. If the fragment was embedded in the iris tissue it was, he considered, good surgery to make the incision over its position and cut off the damaged iris with the imprisoned chipping. Dealing with other aspects of the subject Mr. Gray Clegg said that excision of a suppurating lacrimal sac was important.

Mr. G. H. Pooley (Sheffield) asked whether ophthalmic surgeons were to deal with cases of penetrating wounds of the eye on the lines of tradition; regarding every penetrating wound made by accident as much more dangerous than a penetrating wound of about the same size, tho not in the same position, which was made by the surgeon. Also, was the fear of sympathetic ophthalmia justified by the results? His conclusion was that one was justified in treating penetrating wounds of the eye by conservative methods, and he did not regard accidental penetrating wounds of the eye as extremely dangerous. Even sepsis, in mild form, could be dealt with, and a quiet blind eye was better for the owner than an artificial eye. Wounds caused by glass or steel became septic in a surprisingly small number of cases. He considered that penetrating wounds of the eye could be classified as follows:

Penetrating wounds of the cornea or sclera or both; (a) without prolapse of iris or other tissue and without retention of a foreign body or injury to the lens; (b) with prolapse of iris or other tissue, without the retention of a foreign body or injury to the lens; (c) with or without prolapse of iris or other tissue, or injury to the lens, but with the retention of a foreign body within the eye; (d) the foregoing with injury to the lens.

Wounds in the sclera could be successfully closed by sutures of the finest 30-day catgut, and they should pick up the outer layers of the sclera about 1 to 2 mm. from the wound on each side, and be so tied as to invaginate the cut edges of the sclera and hold them fairly tightly in opposition. The conjunctiva should be sutured over with catgut so as to bury the sutures. If the wound was partly in the cornea and partly in the sclera, the scleral part should be sutured. A gaping corneal wound could be kept in place by indirect suture; i.e., a needle was made to pick up the conjunctiva and a few strands of sclera, and then carried across the cornea at right angles to the wound, and the conjunctiva and sclera picked up on the other side of the cornea. Branched or V-shaped wounds in the sclera could be sutured and the edges of corneal wounds approximated by a modification of the methods he had described. When there were dirty contused wounds, which failed to fit together accurately, a cautious and judicious paring of the edges, with removal of any badly damaged or dirty tissue, was justifiable, so long as the operator left edges which could be brought into accurate approximation without undue tension. When a patient had prolapse of the iris, the prolapsed portion of the iris should be picked up, gently pulled a little further out of the wound, and cut off.

Foreign bodies when present should be removed by the nearest and easiest large corneal or sclerocorneal wound or by a fresh incision at the nearest convenient spot to the foreign body, in cornea or sclera, and the wound dealt with as already described.

When there was an extensive wound of the capsule of the lens, with a fairly large corneal or sclerocorneal wound, after dealing with the iris if prolapsed, any necessary sutures should be inserted; but before tying them it was well to wash out and remove as much of the injured lens as possible, to prevent it from swelling up and adhering to the wound afterwards.

Dealing next with sympathetic dis-

ease, he said this varied very much in the severity of its onset, but it was not a very common disease, and he had never known a case occur when the injured eye was excised within 28 days of the injury. He had never seen it follow a wound penetrating the sclera, even when the foreign body was retained. In practically every case of sympathetic trouble which he had seen there had been injury to the iris, either a neglected prolapse of the iris, or some bruising of it.

Penetrating wounds of the ciliary body were less serious than those of the iris, and were of no special importance, he considered. However severe the injury to the eye might be, he thought it should never be removed within the first fortnight. In conclusion, Mr. Pooley discussed the technic of scleral suture.

Mr. Charles Goulden spoke on the treatment of certain difficult cases of prolapse of iris, and the treatment of cases of nonmagnetic foreign bodies in the anterior chamber. The Chalmers Watson method was to make a small incision opposite the perforating injury, 3 mm. in width, and big enough to admit a repositor, and having done that, the iris prolapse could be dealt with. He did not agree with Mr. Pooley as to the use of scleral sutures; these he regarded as unnecessary, and as likely to lead to escape of vitreous. For the difficult cases in which there was a gaping wound he made an incision round the conjunctiva, then drew the conjunctiva over the wound, so closing the wound. He discussed, by means of epidiascopic illustrations, the methods of dealing with difficult cases of penetration, with retention of magnetic foreign bodies.

Mr. M. H. Whiting compared the efficacy of the Haab and the Mellinger magnets, and gave his reasons for his preference for the former. Power, visibility and convenience were greater in the Haab than in the Mellinger.

Mr. Elmore Brewerton said he made an incision less than 90 degrees away from the radial wound, instead of 180 degrees as recommended and practiced by some.

Mr. T. Harrison Butler defended the Mellinger magnet, which he said he had been using for 15 years, and he had not seen from it any of the disadvantages which Mr. Whiting mentioned. With regard to sympathetic ophthalmia, he said his practice was to remove the exciting eye, and that by doing this in early days, many eyes could be saved. It was very valuable to watch the second eye with the slit lamp; it had given him great help, and in this way he had saved four eyes during the past two years. When there seemed a danger of sympathetic ophthalmitis developing he carried out the treatment as for actual sympathetic disease. Speaking of glaucoma, he said that sometimes after a lens had been wounded the eye became glaucomatous, and the slit lamp would enable that to be prognosticated. In three cases of glaucoma he found flocculi floating in the aqueous, and when such flocculi were not present, glaucoma did not occur.

The President spoke of a recent case in which a boy after an eye injury developed sympathetic ophthalmia in about ten days, without any warning. Later the patient got well and was about to leave, when the house surgeon noted that the other eye was somewhat watery, and contained a speck of keratitis punctata. That evening he excised the eye, ten days after the injury. The other eye then ceased to be photophobic, and the k. p. disappeared. Then in four days there developed the worst condition of sympathetic ophthalmitis the speaker had ever seen. Now, however, the eye, tho damaged, had vision 6/36.

Mr. Lindsay Rea referred to a case of eye injury in a boy, aged 6. It was a valvular wound, and there was prolapse. He removed as much as he was able, and brought the conjunctiva over. Later the eye was seen to be bound down in six places, and there was keratitis punctata at the back of the cornea. He removed the exciting eye, and gave injections of neoarsenobillon into the buttock, which brought out a rash, but the keratitis punctata disappeared. Vision remained 6/6.

Mr. Gray Clegg and Mr. Pooley briefly replied.

H. Dickinson, Reporter.

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CONGENITAL ANOMALIES.

The first three papers in this issue give opportunity to emphasize the importance of the careful study of such conditions, and the need for reports of such cases. The basic service that any physician can render to his patients is accurate, complete diagnosis of his case. On such a diagnosis every valuable prognosis, and every therapeutic service—operative or nonoperative—must rest. The diagnosis must be made in every case, and in every case it is a real service; even if it only furnishes ground for prognosis, or prevents treatment that would be useless, expensive, or even harmful. The diagnosis of congenital anomalies is valuable in itself, even if they cannot be treated; and exclusion of such conditions is an extremely important step in the diagnosis of diseases, that can be treated.

Loring, whose chapter on the normal fundus contains an account of congenital anomalies, said, "Five sixths of the art of ophthalmoscopy are contained in a knowledge of the normal eye, the rest is a series of representations which can be read almost at sight." It is equally true that diagnosis is five-sixths of the art of medicine. It should be an application of all the powers of observation of the diagnostician, and a focussing of all the recorded knowledge of the medical profession, on the questions presented in the individual case; culminating in judgment that is of value in proportion to the breadth of individual experience and of the race experience, on which it is based. Congenital anomalies and individual peculiarities furnish a larger proportion of the things to be observed in arriving at a diagnosis than is appreciated by any except those of widest professional experience.

A young optometrist got an ophthalmoscope and learned to use it, until he saw things. Looking into the eye of the wife of the pastor of the church he had joined, he saw red streaks and black patches tnat were new to him. Looking into his meagre knowledge of ocular disease he saw words like choroiditis, retinitis, atrophy, etc. The woman hurried to an oculist; who recognized and explained her choroid tigré, corrected the error of refraction that had caused her to seek relief in glasses, and so added to the prestige of ophthalmology, as well as to his own. The optometrist soon sought a new field of activity. The same mistake has been made by men with the medical degree who call them-

selves oculists; and with no benefit to themselves or their patients.

The writer has seen congenital absence or displacement of the puncta, which was the unrecognized cause of epiphora; and congenital anomaly of the hyaloid canal or artery, which was taken for cysticercus in the vitreous. A patient came with vision 0.3 in one eye and 1.3 in the other. In the first eye the fundus appeared normal; in the other the whole macular region was disfigured with pigment blotches. The first eye had a congenital amblyopia, the other only a congenital anomaly of pigmentation. An applicant for a blind benefit claimed to have only light perception; and an experienced and careful examiner found such striking changes in his fundus, that the statement was accepted. Later, with the same fundus appearances present, the eye was proved to have not less than 0.8 vision.

In two patients, the writer has seen congenital anomalies of the physiologic cupping of the optic disc, which exactly resembled glaucoma cups. Entire absence of other symptoms of glaucoca, until these patients died several years later, proved that these cups were not produced by excessive intraocular pressure. The anomaly of a protruding opaque optic nervehead will be met by every observer of large experience in ophthalmoscopy. Every one of them should be examined repeatedly and with great care; not only to determine that it is not a case of optic neuritis; but also, that the observer may become so familiar with the appearances of pseudooptic neuritis, that this condition will not be misleading when encountered in a case of headache, injury to the skull, or acute disease, where true optic neuritis might be looked for.

Going back to the anomalies reported in this issue: Persistent pupillary membrane, in an inflamed eye, may easily be taken as evidence of iritis. Congenital deficiencies of abduction and other ocular movements have repeatedly led to muscle operations; that were of no benefit to either patient or surgeon, except such as comes by learning through our mistakes. The anomalies mentioned on page 1 are very rare. But for a knowledge of very rare conditions, we have to rely on the experience of the profession, as recorded in the literature, rather than on our own. All such records should receive careful study and consideration.

E. J.

THE EYE AND INTERNAL SECRETION.

In analysing the effects of the secretion of the ductless glands on the eye, one must consider the results obtained by experimental investigation, as well as those from clinical observation. The former are limited, on account of the restrictions necessarily imposed in experiments on animals; while the admitted check, or stimulating influence of the secretions of one set of glands over another, or combination of glands, complicates conclusions one might be inclined to draw from a more simple scheme of things. No one questions the relation between exophthalmos and hyperactivity of the thyroid. Also the accompanying widening of the palpebral fissure and weakness of convergence.

Removal of the parathyroids in rats is followed by ossification of the lenses. Several observers have noticed the association of zonular cataract in children, with bad teeth from a deficiency in enamel, and suffering from rickets and convulsions. Changes in the brows and lashes have been reported as due to disturbance of the gonad function. There is a strong probability that conical cornea is the result of an edocrin disturbance, its appearance about the age of puberty being strongly suggestive.

Bearing these facts in mind, it would seem that our attention should be focused more on the influence that the endocrin system might have on the function and diseases of the eye. Perhaps we are omitting something in our routine investigation into the cause of certain diseases. Again, there may be disturbances of eye function which will

throw light on the early diagnosis of general disorders. It has been observed that insufficiency of convergence is strongly indicative of hypersecretion of the thyroid and is one of the earliest signs manifested. It is often accompanied by tremor, nervousness, moist palms, headaches and shortness of breath. The importance of diagnosing such cases early is self evident. A large field is open for investigation.

Meyer Wiener.

CASE RECORDS.

The most important, universally available means, for carrying on graduate study in medicine, is the keeping of case records. Nothing compares with it as a stimulant to the careful systematic study of cases, the improvement of methods and increasing thoroness in the examination of patients. Combined with a moderate amount of daily reading, in connection with the conditions one meets in practice, it is the most certain road to fitness for the management of cases, financial success and good standing in our profession.

A good case record of ocular disease is impossible without complete intelligent examination of the case; and presupposes a good medical education and adequate training in ophthalmic diagnosis. The effort to keep a good record of every case gives opportunity to, and tends to draw out and develop powers of observation and judgment, in the course of every day work at home, that may easily be missed in the largest clinics and under supervision of teachers of the widest reputation.

The American College of Surgeons has come to rely very largely on the case records he submits, to judge the professional qualifications of any applicant for fellowship. These records can be checked up, so far as necessary, by comparison with the records of the hospital in which the surgery is reported to have been done. To a somewhat less extent the American Board for Ophthalmic Examinations uses case records in judging of the fitness of the applicants for its certificate.

It is often asked what kind of records are demanded for such examinations. The only absolute demand is that the records shall be genuine and legible. But a good record will possess, to a considerable degree, certain qualities. It will present all the important facts that are relevant to the case. It will present as few negative statements as possible; only those required to exclude conditions that might have been expected along with conditions that were present. It will tell the story as clearly, briefly and systematically as possible; following a certain order of arrangement of the facts, without making obtrusive the skeleton on which the record has been built up, by writing in the different headings and subheadings that are used to classify the information. For examination purposes, some headings and negatives are allowable, to show that the plan of case study has been broad enough and minute enough, to bring out other symptoms if they had been present. But constant reminders of this kind of scaffolding, mar the excellence of the literary structure it has been used to erect.

In this journal we give sample case records, submitted by successful candidates for the Certificate of the American Board for Ophthalmic Examinations (See v. 8, pp. 721, 723 and 779); which present cases of sufficient interest to be worthy of publication; and which illustrate what constitutes a good case record. They also illustrate the fact that the material for graduate study, and valuable scientific communications is all around us, forcing itself on our attention every day. It is only the alertness of mind, fund of information already stored, habitual, conscientious readiness to learn all that can be learned about each case, and practise in briefly recording it in good English, that are needed to make one a valuable contributor to the common fund of scientific knowledge.

E. J.

BOOK NOTICES.

Transactions of the Section on Ophthalmology, American Medical Association, 1925. 425 pages, 27 ill. 23 plates. Published by the A. M. A. Press, Chicago, Illinois.

Printed and bound transactions of societies usually meet the fate of being buried in the unused shelves of the bookcase. They do not have the wide circulation that is given by a journal such as the AMERICAN JOURNAL OF OPHTHALMOLOGY. Therefore, where essays of particular value are included, it is well to give them a wider circulation. The twenty essays published in the volume make interesting reading. A few stand out as of the greatest importance. These are: "The Diagnosis of Blindness" by Edward Jackson and that on "Visual Efficiency of Various Degrees of Subnormal Visual Acuity. Its Effect on Earning Ability" by Albert C. Snell. These two, taken in conjunction with the discussions, the Report of the Committee on Visual Standards for Drivers of Motor Vehicles and the Final Report of the Committee on Compensation for Eye Injuries, make the volume a well balanced review of the Economic Relations of Vision.

Edward Jackson's essay is the result of examinations into the cause and effect of blindness in 704 blind or near blind eyes, from all the common causes of blindness. "This fact stands out: Except in amblyopia, congenital or associated with squint, blindness is always associated with objective changes that declare the sight has been greatly impaired, and often furnish the most important evidence how great that impairment is."

Albert C. Snell's essay is admirably summed up in the following conclusions:

"1. No loss to earning ability even for the highly skilled work was found until visual acuity was reduced to 20/60 Sn. The threshold for the beginning of visual disability as reflected in earning ability lies between 20/60 and 20/100 Sn.

"2. The accumulated effect of repeated trivial injuries must not be ignored from an economic point of view for those cases in which a single injury does not reduce acuity to 20/40 or less, as repeated injuries of the same degree may finally cause loss to earning capacity.

"3. A 20/200 Sn. caused a total incapacity to 13.3 per cent and a partial incapacity to an additional 13.3 per cent, so that 26.6 per cent in this class with vision of not better than 20/200 Sn. were either completely or partially incapacitated for earning. Eighty per cent had earning capacity with acuity between 20/200 and 20/400 Sn.

"4. A 10/200 Sn. was the point of visual acuity reduction which became the point of total incapacity in all except two cases, and this may be regarded as the lowest limit of visual earning capacity.

"5. The threshold of total incapacity lies between 20/200 and 2/200 Sn., depending on the nature of the employment, age of the defective person, the duration of the subnormal vision, and on his individuality (his will to work).

"6. An acuity of not better than 20/40 Sn. in the better eye does not cause a loss of 50 per cent either in efficiency or in earning ability. This degree of acuity, in fact, causes no direct loss to earning capacity. However, its direct influence from two economic points of view must be considered: (1) that of the accumulated effect of these degrees of loss due to repeated injury, and (2) the effect of such degree of substandard vision on the competitive ability."

It seems essential in view of the rapidly growing number of automobile maimings and fatalities to require that a driver see well enough to recognize warning signs and directions and to miss collisions with pedestrians and other vehicles. The reviewer agrees with Dr. Lancaster, who offered an amendment which allowed the county boards to qualify candidates who have less than 20/50 in one eye and 20/100 vision in the poorer eye, when conditions justify such action. For it must be remembered that even this low vision, which is detrimental to earning a living, may permit sufficient gross per-

ception of objects to permit of safe driving. We see with the brain and if the visual centers are good in otherwise qualified drivers, some blurred vision will guide the hand and the car.

And now we come to visual efficiency as an economic factor in computing compensation for loss thereof, as regulated by the Committee. E. E. Holt's remarks are apropos:

"The economic value of a thing must be determined before the percentage of loss is obtained. To do this we must employ mathematics which is the universal language of the world of values."—The report is empiric and out of forty essential statements made in it, nineteen are correct and twenty are inconsistent.

If we are going to settle this question let us do it mathematically as Magnus did, using only one empiric factor, that of computing ability which can be adjusted by experience, resulting in values very similar in amounts to that obtained by empirical legal procedure, and which balance with the statistical results of investigation into individual loss of earning ability. It seems to the reviewer, who has given the subject much study and debate, that the empirical table of losses now used by the U. S. Government, Great Britain, France, by Italy and other foreign countries and by many State Industrial Boards, offers an equitable adjustment of compensation that needs no amendments.

H. V. W.

Eye, Ear, Nose and Throat Manual for Nurses. By **Roy H. Parkinson, M.D.,** visiting Oculist and Aurist to St. Joseph's Hospital San Francisco. Cloth, 12mo., 207 pages, 51 illustrations. St. Louis, the C. V. Mosby Co., 1925.

The first four chapters of this book, 62 pages, are devoted to descriptions of the throat, nose, ear and eye respectively. Then follow chapters on: External Ocular Diseases; Diseases of Refracting Media of the Eye: Internal Diseases of the Eyeball; and Points in Care and Treatment of Eye, Ear, Nose and Throat Conditions. The above constitute the first part of the book. The second part contains three chapters on: Operating Room Technic; Technic of Preparation and Conduction of Eye Operations; and Description of Individual Eye Operations and Illustrations of Eye Instruments. Part three consists of Chapter XII, on Public Health.

Each of the first seven chapters ends in a "quiz" of 20 or more questions, covering the subject matter contained in it. According to the preface: "All that is intended is to give the student nurse a general idea of what may be encountered in eye, ear, nose and throat cases, in order that she may be enabled to follow directions given by the physician. Debatable questions and theories are intentionally avoided as are many details which are of interest only. Technical discussions have been considered a waste of time and would not help our purpose as these belong only to the realm of the specialist."

The final chapter "Discusses problems of the public health nurse. As far as the writer knows no work has appeared for this need. He has been consulted many times by those engaged in this field of endeavor for information relative to these problems and this part is given as an answer to the possible difficulties encountered by the public health nurse." More than half of this chapter is given to the examination of children's eyes and the testing of vision. The role of the public health nurse as an educator is pointed out. The difference between an oculist and an optician or optometrist and the danger of entrusting health examinations to the latter are emphasized.

There is a good index, and the book is well printed and well illustrated. Some of the specific directions might be open to criticism; as cocainizing the eye by six instillations of 5 per cent cocain followed by 5 instillations of adrenalin; or directions for such rare operations as for abscess of the lacrimal gland or the Krönlein operation. But, on the whole, the selection of material is good, and the teaching is in good clear English.

E. J.

Eyesight Conservation Survey, compiled by **Joshua Eyre Hannum,** M.E. Research Engineer. Edited by Guy A. Henry, General-Director, Eye Sight Conservation Council of America. Paper, octavo, 220 pages. New York. Eye Sight Conservation Council of America.

This book sets forth what has been collected in a survey of the literature relating to ocular defects, and a survey of the frequency of such defects in different classes of workers and school children. Of the references in the bibliographies, over 70 per cent are to nonmedical literature — educational and engineering journals, government reports, etc. Its chief value to the ophthalmologist will be such references and the excerpts giving some acquaintance with a literature which is not generally brought to his attention; and which contains some observations, and illustrates a point of view with which he might well be made familiar. The emphasis on nonmedical facts and interests related to vision is so strong as to raise the suspicion that this is an attempt to separate the eye from the rest of the body; and make its hygiene the especial business of illuminating engineers and the makers of glasses.

Its departure from the medical point of view may be illustrated by two of the definitions of terms which follow the introduction:

"Normal Eye.—A normal eye is an eye which is free from any error of refraction. The technical term is emmetropia, which means the condition of being without an abnormal refraction of the eye. (Gould's Medical Dictionary.) Synonyms: Normal eye, perfect eye, emmetropic eye.

"Defective Eye.—A defective eye is an eye which has a perceptible error of refraction or where visual acuity has been lowered by disease of one or more of its parts. The technical term is ametropia, which means an abnormal refraction of the eye. (Gould's Medical Dictionary.) Synonyms: Defective eye, abnormal eye, imperfect eye, ametropic eye."

It is also noticeable by the careful avoidance of any discrimination between the oculists having a fundamental and general medical education, and the "registered optometrist" who may be conscientious and skillful along the lines he has pursued, but is ignorant as to the intimate relations of the body as a whole. This disposition to favor the confusion of oculist and the optician-optometrist is illustrated in this passage:

"Provision should be made whereby every employee shall receive periodically a thoro eye examination by a competent refractionist, i.e., one skilled in the science of measuring the human eye to determine defects of vision." The "competent refractionist" or the "eye specialist" of these pages might be either a fully educated doctor of medicine, or a licensed optometrist; there is care not to distinguish between them by any statement implying that the one kind of "eye specialist" is any better qualified to give advice with reference to the eyes than the other.

Understanding the point of view from which this work has been compiled, one should not expect to learn from it much about the hygiene, defects and diseases of the eye to which the first 3 chapters, 32 pages, are devoted. Chapters IV, Eyesight and Education, V, Eyesight and Occupation, VI, Eye Protection and VII, Illumination, furnish a massing of facts, often presented in statistics with which the oculist may well desire to make himself acquainted; and which will certainly broaden his appreciation of the interests concerned in good vision. It is interesting to see how school authorities, and business leaders are taking up the importance of good sight to physical and mental development and business efficiency. It is equally important to appreciate that illuminating engineers and the makers of glasses are seeking their own advantage thru service to the community. The more than 200 references to articles published outside of the literature of medicine, indicate how broad is the interest in the cause of good sight.

In Chapter VIII, on "Eyesight of Noted Persons," brief extracts from the writings or annotations (especially

from Gould's Biographic Clinics) set forth some struggles and experiences of some 15 people who had become blind, including Milton and Roosevelt, and from Jonathan Swift to Basil King. As a whole this book is packed with information carefully compiled; and its bibliography of 16 pages contains a large proportion of references, particularly as to illumination and the use of goggles to protect the eyes, that are not found in medical publications. Its index makes it useful as a book of reference E. J.

Transactions of the College of Physicians of Philadelphia, 3rd series, vol. 46, 1924. Edited by Walter G. Elmer, M.D., Cloth, 8vo., 1016 pages, illustrated. Philadelphia. Printed for the College.

This well printed volume appropriately presents the annual record of a prosperous, conservative, but wide-awake scientific society in the 137th year of its professional activity and leadership. After the table of contents, is printed its list of 25 presidents, including some of the most famous names of American medicine. Then come the list of officers and standing committees, and the list of 515 Active, 21 Associate Fellows of the College. After these are lists of those who have received the various prizes awarded under the administration of the College, or who have in the past delivered the different endowed lectures, numbering in all 103 recipients thus honored.

The address of the President is followed by 17 papers read before the College in the year, with the discussions on them, occupying some 300 pages. But the greater part of the volume is occupied by the proceedings of the 4 Sections of the College. The Section on Ophthalmology, as the senior section, occupies the first place. Its proceedings have already been presented to readers of the A. J. O.; they contain most of the papers included in this volume, bearing directly on ophthalmology. Other important papers, bearing somewhat on ophthalmology, are one on Dystrophia Adiposogenitalis with Retinitis Pigmentosa and Mental Deficiency, by Solomon Solis-Cohen and Edward Weiss; and one on Surgery of Brain Tumors; based on 828 cases by Geo. J. Heuer, of Cincinnati.

A very important achievement of the College of Physicians of Philadelphia has been the building up and maintenance of its library. The 23 page report of the Library Committee contains matter of general interest to lovers of books. This Library is one of the great medical libraries of America, containing 144,421 bound volumes, 21,760 unbound "Theses" and "Dissertations," and 145,691 unbound pamphlets. This report contains a list of the "Incunabula" and of rare medical works of special interest, medical classics acquired during the year. Of these, published about or before the year 1500, the library now contains 348 volumes. Such collections possess an interest, that widens and intensifies as members of the medical profession develop their knowledge of and interest in books. In the direction of ophthalmic literature, the writer can bear testimony to the interest and usefulness of this library of the College of Physicians of Philadelphia.

E. J.

The Sphenoidal Sinus (Le Sinus Sphenoidal, Anatomie, Exploration Chirurgie) by **Georges Canuyt** and **Jean Terracol,** Faculty of Strasbourg, France. In one volume of 278 pages with 134 illustrations. Masson et Cie, publishers, 25 francs.

The sphenoidal sinus is now taking a place in pathology, particularly prominent on account of the ocular complications of optic neuritis and ocular muscle paralyses. In 1882, Hajek of Vienna said, "This cavity is outside of our realm of instrumental and surgical procedure," but it is never well to prophesy in medicine. In the same year Zukerkandl showed how to open the sphenoidal cavity by the nasal route on the cadaver, and three years later Shäffer operated for the first time in history upon a living person. This was then a heroic procedure, but now every competent rhinologist should be prepared to operate, if necessary; but even now the risk to life is somewhat great.

Diseases and complications, due to pathologic processes in the sphenoid, have had much research. Little by little anatomic investigations, improved radiologic technic, clinical study, and the results of surgical operations have pointed towards a solution of the sphenoidal problem. Canuyt and Terracol have here evolved a practical treatise for the rhinologist, giving in a condensed form the anatomy, exploratory methods, and the surgical technic of endonasal operations. Numerous dissections and extensive studies of the anatomy were made by the authors; as the surgery of this part is dependent upon an intimate knowledge of the subject. Exploration and radical procedures are to be made under adrenalin-cocain anesthesia. Catheterism of the antra, simplifying of endoscopy, transillumination and puncture expose the diseased conditions in detail. Radiology has covered numerous pages of print. Radioscopy, by the intrabuccal film and radiography thru the base of the cranium gives definite information. The surgical aspect is the most important part of the book. All the indications for operation are designated and the technic is minutely described. The sphenoidal antrum affords a route of access to the hypophesis. The method of operating is explained in all its details in such a fashion that the surgeon who is not a rhinologist may perfectly understand the procedure. Postoperative complications are treated in a separate chapter. The reader is thus given an insight into all the relations of the sphenoidal cavity. The ophthalmologist will profit by its perusal. A translation in English is recommended to the authors.

H. V. W.

CORRESPONDENCE

Medullated Nerve Fibers Involving the Macula.

Speaking of the medullated nerve fibers involving the macula (Am. Jour. of Ophth., Sept. 1925, p. 713) George F. Libby says: "No available ophthalmic literature showed a case in which the macula was covered." A similar case was, two years ago, observed by me and mentioned in my new book on "General Ophthalmology," which appeared in January 1925 (Tabl. IV, fig. 13).

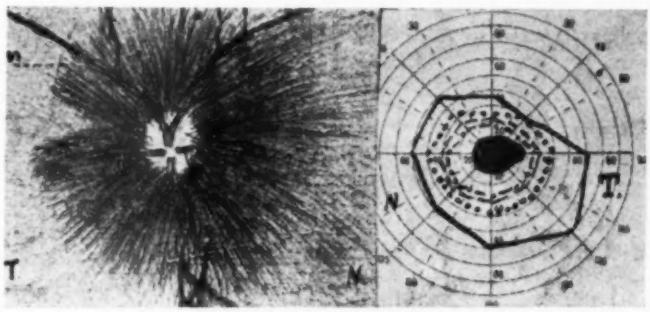

Fig. 1. Opaque nerve fibers involving the macula and the resulting scotoma.

A girl of 17 years presented herself for very weak vision in the right eye, dating from birth; and the examination of the eye gave a very high myopia (—16D). The ophthalmoscope examination disclosed the unusual condition of medullated nerve fibers, spreading from the papilla and involving the macula itself. The vessels were covered by them on leaving the papilla and reappeared far away from the papilla. Vision: 1/50; sph.—13.= 3/50. The visual field showed us a big central scotoma; this scotoma was absolute.

I thought at that time that the case merited mention, so I published the figures in the Atlas of my "General Ophthalmology," and reproduce them here. Fig. 1, shows us the medullated fibers and fig. 2—the visual field, the left eye is normal.

PROF. D. C. PASCHEFF.
Sofia, Bulgaria.

Oxyoptric Tables and Test Types.

To the Editor: The readers of this journal will no doubt remember that I made them acquainted with the test-tables of a new method, invented by Blaskovics, professor of ophthalmology at the Budapest University. This article appeared in the August issue of the past year (Vol. 8, No. 8, p. 653). Blaskovics called his tables, "oxyoptric tables." The author came to the conviction, that his tables would not become spread, neither in America, nor in England; the tables being constructed for a distance of 5 meters, and in these countries the visual acuity is taken from a distance of 20 English feet. The author transformed his tables for this distance in order that there should be no obstacle in the spreading of the tables. In the supplementary test, the author explains the advantages of the test, that is, the visual acuity is not expressed in fractions or decimal numbers, but in integers and this expression in full numbers makes the decrease or the increase of the visual acuity comprehensible at once, so that we need no long consideration about it. The introduction of the oxyoptric method supersedes the calculation with fractions. The oxyoptric test types start from the accepted Landolt's ring and the letters are constructed in such a manner, that the recognition of them is identical with the recognition of the Landolt ring.

The author constructed a reflecting apparatus also which gives a uniformly distributed light. This apparatus is obtainable of Calderoni, Budapest. The printer's execution of the tables is first class work.

I warmly recommend the purchasing of these tables and the using of the oxyoptric system to my American colleagues, that is, for everybody who does visual tests; especially for clinics, hospital departments, where pupils are taught, because only in such a manner is the system possible for general acceptance.

Budapest. J. FEJER.

Modified Tendon Tucking.

To the Editor: While my experience with the following modification of the usual tucking operation has been limited, it presents such obvious mechanical advantages, that a brief report may be justified.

The tuck is made as usual, its base being slightly farther back from the tendinous insertion, than the height of the tuck itself. It is then secured by a catgut suture at each edge, embracing less than 1/3 of the tendon. Two heavy silk sutures are now placed as in Reese's advancement operation. Each goes from without inwards, thru the conjunctiva and tuck, at the junction of the middle and outer third, and back from within outward, near the edge of the tuck. The suture is tied on the outside, and reintroduced behind this stitch thru the tucked tendon. It then is inserted thru the scleral attachment of the tendon, picking up some of the scleral fibres, and on thru the conjunctiva anteriorly. The two ends of each suture are now tied, giving the same result as in a resection. By introducing the scleral suture anterior to the tendinous insertion, the result would resemble an advancement.

The advantages of this treatment of the tuck are security against slipping, and a much neater appearance following operation.

SAMUEL A. DURR.

San Diego, California.

ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post, 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

Guillery, H. Sympathetic Ophthalmia, a Tuberculotoxic Disease. Münchener medicinsche Wochenschrift, 1925, No. 8, p. 298.

The results of Guillery's elaborate investigations on the pathogenesis of sympathetic ophthalmia have been further supplemented and corroborated by his researches of the last few months. He has succeeded regularly in eliciting sympathetic ophthalmia in rabbits with propagation to the second eye. A sympathetic ophthalmia develops if a tubercular toxin is administered after the establishment of uveitis in one eye. The toxic uveitis can be produced by hematogenous infection. Thus the same products which acted in the injured eye can also act in the second eye. By addition of the tuberculous poison a similar uveitis develops in the second eye. The identity of the findings in the animal experiment with those of the human eye justifies the assumption of the same process.

C. Z.

Orlow, K. Myositis Fibrosa of External Ocular Muscles. Klin. M. f. Augenh., 74, March-April, 1925, p. 466, ill.

The clinical history and histologic description of the extirpated muscles in a man of 59 years old with interstitial myositis, exophthalmus and swelling of lids are given and 4 cases quoted from the literature. The clinical aspect of all 5 cases was, swelling of lids, exophthalmus and especially important, early appearance of extensive paresis of the ocular muscles. On account of a perforating corneal ulcer, one eye had to be enucleated. Palpation of the muscles after operation revealed this cartilaginous consistence. The extirpated inferior rectus showed small celled infiltration of the interstitial tissue and thickening of the walls of the blood vessels. The affection is probably syphilitic or tuberculous.

C. Z.

Chow, Yan. Varicella of the Conjunctiva. Klin. M. f. Augenh., 74, March-April, 1925, p. 484.

Two cases of varicella of the bulbar and palpebral conjunctivae with nodules and infiltration at the limbus and cornea are reported. At the ciliary borders of the lower lid of one were small vesicles and pitted red nodules. The affections healed in two weeks without leaving scars, which shows the good prognosis in this disease.

Varicellae are probably multiple emboli in the intermediate layer of the epidermis, while the variolar vesicles are due to necrosis in the deeper strata of the epidermis. Varicellae and variolar vesicles appear alike in the conjunctiva probably because of the lesser differentiation into layers of this structure as compared with the skin.

C. Z.

Feigenbaum. Relation Between Unilateral Trachoma and Nasal Affections. Klin. M. f. Augenh., 74, March-April, 1925, p. 392.

Feigenbaum noted that in many cases of monocular trachoma there was a nasal disease of the affected side. The connection seems to be due to reflex action. Chronic catarrhal conditions of the nose cause a relaxation of the conjunctival vessels with subsequent poor nutrition, which renders the tissue less resistant to infections. An early treatment of the nose is considered of utmost importance.

C. Z.

Baer, Carl. Circular Anastomosis Between Branches of the Central Vein. Klin. M. f. Augenh., 74, March-April, 1925, p. 412, ill.

In an otherwise perfectly normal left eye of a man, aged 34, the two branches of the central vein, before immerging into the tissue of the optic disc, unite by a doubly bent loop of the same calibre. This projects into the vitreous. Shortly after its origin from the upper branch of the central

vein, it emits a thin branch into a cilioretinal vein which comes from above and the temporal side and disappears at the margin of the disc. A branch of the lower main branch, which runs from below and the nasal side towards the disc, gives off an anastomosis to a branch of the upper main branch which comes from above and the nasal side. The connection of this branch with the upper central vein is not visible, because it previously enters the disc, but undoubtedly takes place in slight depth. A small cilioretinal vein and artery are noted at the lower temporal portion of the disc. The main branches and the loop show venous pulse, and the loop stretches and rises synchronously with the venous pulse. Thus there was an anastomosis of all veins on the disc, an anastomostic circle, which also was connected with a cilioretinal vein.

C. Z.

Kreiker, A. Endogenous Tuberculosis of the Tarsus. Klin. M. f. Augenh., 74, May-June, 1925, p. 642.

A woman, aged 28, who had disseminated lupus vulgaris on the trunk and all extremities, with special affection of the lungs, presented numerous yellowish nodules on the conjunctivae up to the intermarginal line around the ducts of the Meibomian glands.

As the histologic examination of an excised piece proved the tuberculous character, the upper tarsus was removed and the other foci curetted, with good results.

In the second case, a child, aged 6, tuberculosis tarsi was cured with Roentgen rays. The first case was too far advanced for radiation.

C. Z.

Malkin, B. U. Chloroma of the Orbit. Klin. M. f. Augenh., 74, Jan.-Feb., 1925, p. 113.

Chloroma of the orbit is a rare disease of obscure etiology and histopathogenesis. The clinical history and histologic findings of a boy, aged 13, are related in detail, in connection with a review of the literature. The microscopic examination revealed that the glistening light green granula, imparting the green color to the tumor, gave all reactions of fat and are to be classed under the lipoids. The examination of the blood and the general condition in tumors of the orbit may yield useful suggestions for the diagnosis.

C. Z.

Miyashita. Width of Pupil in High Myopia and in Pigment Degeneration of the Retina. Klin. M. f. Augenh., 74, Jan.-Feb., 1925, p. 157.

Miyashita found with the pupillometer, that after five minutes in the dark room the width of the pupil in low and medium myopia, and mostly in high myopia, up to 12°, was much greater than in emmetropia, ranging from 5.1 to 5.5 mm. while in emmetropic pupils it ranged from 4.28 to 5.05 mm. Beyond —13°, the pupil always was smaller than in emmetropia.

The following points may be considered: 1. In high myopia, the anterior chamber is deep and the lens is relatively far back so that the basal and pupillary parts of the iris lie in an almost perpendicular plane. 2. The pupil appears small because the anterior chamber is deep. 3. There is an almost constant disturbance of dark adaptation in high myopia.

In pigmentary degeneration, and all cases of hemeralopia, the pupil is smaller than normally. The causes might be: 1. Sclerosis of the vessels of the iris. The blood pressure is generally high. 2. Vagotonia is probable because of the occasional coincidence with glaucoma. 3. Senium precox. 4. Disturbance of dark adaptation.

In hemeralopia, the dilatation of the narrow pupil is retarded. If there be two kinds of light reaction, this would be chiefly a disturbance of light reaction of the rods.

C. Z.

Rohrschneider, W. Arcus Senilis and its Relation to Atherosclerosis. Klin. M. f. Augenh., 74, Jan.-Feb., 1925, p. 93, ill.

From his anatomic examinations of 100 cadavers of individuals of various ages, Rohrschneider found that the deposits of fat at the corneal limbus in

arcus senilis are not due to fatty degeneration, but to fat infiltration. The fats were mostly isotropic. Anisotropic fat drops were found in very small quantities. In the majority of cases the first traces of fat occurred in the third decade. In the seventh decade, the arcus senilis is generally fully developed. There are, however, exceptions in that the formation of arcus senilis progresses more rapidly or commences later or remains stationary. In intense atherosclerosis arcus senilis is almost always present, but the reverse is not necessarily true.

C. Z.

Versé, U. The Cholesterin Content of the Blood in Arcus Senilis. Klin. M. f. Augenh., 74, Jan.-Feb., 1925, p. 110.

Versé produced in rabbits arcus senilis by feeding them cholesterin with neutral fat and oil—thus creating an hypercholesterinemia. In two men, however, with very marked arcus senilis, who died from marasmus and cachexia, the blood content of cholesterin was abnormally low, which warns against conclusions from a single blood test with regard to longer existing changes, (arcus senilis, atherosclerosis, etc.), without consideration of the other conditions. C. Z.

Filatow, W. P. Successful Partial Keratoplasty. Klin. M. f. Augenh., 74, May-June, 1925, p. 746, ill.

The right eye of a man, aged 24, was removed on account of cyclitis and commencing atrophy. The left eye showed a total adherent leucoma. Its center was removed with the trephine and a piece of clear cornea from a glaucomatous eye implanted. After six days, the transplanted piece was opaque, but after one and one-half weeks commenced to clear up, and vessels from the periphery entered it. After three months vision rose from 0 to 1/60 with +10 sp. The opaque lens with some loss of vitreous had escaped at the time of the operation. After nine months vision equaled 3/60 which remained the same after three further months, so that the transplantation could be considered a success.

C. Z.

Frank-Kamenetski, S. G. Hereditary Juvenile Glaucoma. Klin. M. f. Augenh., 74, Jan.-Feb., 1925, p. 133, ill.

Eleven cases are reported of a hitherto undescribed juvenile form of glaucoma simplex with a peculiar congenital lack of the anterior layer of the iris. It occurs exclusively in men of the Russian population of the province of Jekutsk and plays an important part in the etiology of incurable blindness. For many reasons it is assumed that a congenital lack of the connective tissue of the stroma of the iris, an otherwise very rare congenital disorder, is the primary disease and the glaucoma secondary. It is hereditary by recessive sex-bound transmission. In some cases an early operation, (iridectomy, trephining), arrested the glaucoma with more or less useful vision.

C. Z.

Paderstein, W. Swimming Tank Conjunctivitis. Klin. M. f. Augenh., 74, May-June, 1925, p. 634.

Paderstein observed several epidemics at Berlin, which he at first diagnosed as trachoma on account of the great similarity to that disease. After sterilizing the tank with chlorin, the disease did not recur. This almost proves that the transmission of the disease is effected by the water. Characteristics of the disease were: One sidedness, protracted course, scantiness of secretion and subjective ailments, residual ptosis, negative bacterologic findings and inclusion bodies. If the follicles and swelling of the retrotarsal folds do not subside under astringents, sulphate of copper and nitrate of silver are recommended by the author. A contagion thru the schools has not been proved in a single case.

C. Z.

Reitsch, W. Pupillotonia and Accommodation Tonia. Klin. M. f. Augenh., 74, Jan.-Feb., 1925, p. 159.

Pupillotonia is characterized by a generally one sided tonic reaction of convergence with wide pupil, when light reflex for ordinary light contrasts is abolished or very much diminished. In 50% of the cases, it is associated

with tonic reaction of the ciliary muscle. The differences from reflex immobility are discussed and a case reported of a woman, aged 30, in whom the pupillotonia developed after ophthalmoplegia interna. The tonus of accommodation lasted for over 35 minutes and was neutralized by +2.00 Sph. The patient suffered from headaches during the tonus, which were relieved by homatropin. The affection is probably due to a sensitiveness of the small celled median nucleus to a still unknown toxin.

C. Z.

Hessberg, R. Pigment Ring of Lens in Pseudosclerosis. Klin. M. f. Augenh., 75, July-August, 1925, p. 12, ill.

Hessberg observed a boy, aged 19, affected with pseudosclerosis, in whom by a left congenital iris coloboma, the free lens border was visible. There was a greenish ring here. Seen with the slitlamp, it consisted of numerous small pigmented dots, densest at the periphery. In microspectroscopic examination it gave the spectrum of urobilin which seems to play an essential part in the whole morbid process. Very likely the ring was located in the capsule. The pigmentation in pseudosclerosis perhaps occurs at first in the liver and from there is conveyed by the bloodstream to the eye.

C. Z.

Pincus, F. Extension of Dental Inflammation to Eye. Klin. M. f. Augenh., 74, May-June, 1925, p. 730, ill.

A man, aged 28, complained of pain in right side of head, swelling of right eye, exophthalmus, diplopia and difficulty of moving the eye upward from paresis of the rectus superior; optic disc was hyperemic and its borders were hazy. Three weeks previous a second molar was drilled, filled and a crown put on. Two days after admittance to hospital for the eye he had the molar extracted, at first with relief of the eye symptoms, which then returned and did not cease until after opening of the maxillary sinus.

The etiology was explained by the examination of the extracted tooth. The bone canal led from the carious remnant of the tooth into the root, which had the shape of an arc, and from the root canal, thru the wall of the root, into the upper maxilla so that decayed material and chemical substances were pressed into the maxilla, causing the inflammation which was propagated to the eye thru the ophthalmofacial vein.

C. Z.

Siwzew, D. A. Meningitis After Elliot's Operation. Klin. M. f. Augenh., 74, May-June, 1925, p. 739. ill.

The right eye of a woman, aged 54, was trephined for glaucoma on January 21, 1924. On April 8th, she returned with symptoms of meningitis and panophthalmitis. On April 11th evisceration, but no abatement of meningitis; death the same evening The pus of the eye contained Fränkel's pneumococci. The autopsy and microscopic examination made it seem probable that the infection occurred thru the trephine wound, then along the vessels into the orbit and the interior of the skull.

C. Z.

Velhagen, K., Jr. Scleral Epithelial Implantation Cyst. Klin. M. f. Augenh., 74, 1925, May-June, p. 703, ill.

A girl, aged 11, was hit by a stick in the right eye with lacerated corneoscleral wound and prolapse of iris. The prolapse was excised and the wound covered with a conjunctival flap. Half a year later the patient returned, presenting a scleral cyst at the site of operation. The cyst did not communicate with the interior. The tumor was extirpated. Its walls consisted of three layers: stratified pavement epithelium, coarse lamellar connective tissue and organized granulation tissue. The origin is attributed to scattered epithelial cells of cornea and sclera.

C. Z.

Friede, R. Extirpation of the Palpebral Lacrimal Gland. Klin. M. f. Augenh., 74, May-June, 1925, p. 682.

Friede observed in some cases obstinate conjunctivitis with mucous

secretion after extirpation of tne palpebral lacrimal gland according to Axenfeld's method, which consists in a longitudinal incision, leaving a large scar that may give rise to irritation. He, therefore, performs canthotomy which exposes the gland much better and gives access to it in its broad axis at the technically most rational place, the lower pole, and reduces the conjunctival incision to a minimum. The lower pole is more adherent while the upper pole is in loose connection so that it can be easily extracted after the lower pole has been freed.

Friede is occupied with studying the question whether a total or partial obliteration of the duct may suffice for diminishing epiphora, so that the extirpation of the gland would not be necessary.

C. Z.

Felix, C. H. Congenital Familial Cornea Plana. Klin. M. f. Augenh., 74, May-June, 1925, p. 710.

Two brothers, aged 12 and 9, showed a marked flattening of the anterior segment of the eye, especially of the cornea. The normal sulcus between cornea and sclera was absent and the curvature of the cornea passed without interruption into that of the sclera. The cornea showed a central disciform opacity. The measurements with Wessely's keratometer were 9.5 mm. horizontal, 10.50 mm. vertical, giving the cornea a standing oval shape. The curvature was irregular. V=3/10 with —13 D. Sph. In the older brother the measurements were within normal borders, in the younger those of slight microcornea. Felix considers it as a mere anomaly of development on account of the familial occurrence, lack of any source of infection and inflammation, a presence of epicanthus or ectopic pupil or remnants of pupillary membrane and the absence of vessels in the central opacity. Aplanation of cornea in postembryonic life is found only in phthisis bulbi and after extensive deep ulcers.

C. Z.

Kuriks, O. Biomicroscopy in Leprosy. Klin. M. f. Augenh., 74, May-June, 1925, p. 749, ill.

Kuriks examined in Esthonia 223 lepers, 16 of them for a longer period with the corneal microscope and slit lamp. In 7, he found minute nodules of the iris, so small, that they could be seen only with the corneal microscope. They were grey, yellowish or white; round or oval, and seemed to consist of a homogeneous mass, on the surface, in the crypts and in the tissue, with a predilection for the temporal portion, mostly at the region of the minor circle, giving the aspect of sand or oily layer. Most probably they are lepromata, because in some cases the simultaneous nodules of the cornea of the same appearance contained lepra bacilli. In some cases the nodules were black, in others brown. In none were there changes of the fundus. C. Z.

Jaeger, E. Histology of Parenchymatous Keratitis. Klin. M. f. Augenh., 74, March-April, 1925, p. 488.

A man, aged 21, affected with parenchymatous keratitis for 5 weeks, who showed positive Wassermann reaction and whose father had died from general paralysis, developed influenza and died after two days. The autopsy revealed severe hemorrhagic encephalitis and hemorrhagic infiltration of the lungs. The histologic examination of the eyes disclosed thickening of the epithelium of the cornea, infiltration of the parenchyma, with lymphocytes filling the spaces between the separated lamellae and edematous expansion of their interstices. Other cells were most likely proliferated corneal corpuscles. Corresponding to these infiltrations, the tissue of Descemet's membrane was permeated by lymphocytes and leucocytes and its endothelial layer showed cellular and fibrinous deposits. If vessels were encountered they coursed immediately over Descemet's membrane from the limbus to the center of the cornea. Iris, ciliary body, lens and sclera, exhibited slight changes.

According to these findings, the primary lesion is in the parenchyma,

causing the foci of infiltration and inflammation. Apparently the accumulation of migratory cells, which can come only from the scleral and uveal vessels, the proliferation of the fixed corneal corpuscles and the slight edema between the lamellae were the first changes. The necrotic processes were secondary and much less frequent. Spirochetes could not be found. C. Z.

Zavalia, Alberto Urrets. Subconjunctival Injections of Sulphate of Copper in Treatment of Trachoma. La Semana Medica, Sept. 17, 1925.

The author states that he has used all kinds of treatment, the main trouble being with the psychology of the patients, who as a rule are ignorant and do not keep up the treatment until cured. Most of them have tried home treatment until the trachoma is far advanced. It is necessary to create an atmosphere of optimism in the patients and in the medical profession, for trachoma can be cured or relieved in nearly all cases.

The author has used subconjunctival injections since they were first suggested by Santos Fernandez in 1897, who used permanganate of potash. Bichlorid of mercury, sulphate of copper, iodid of soda, sea water and sterilized air have been used. The main effect is produced by the tumefaction and resultant absorption rather than by the specific medication. The most satisfactory method has been that of Nicati of Marsella, who reported many cases cured by subconjunctival injections of sulphate of copper. The author's method parallels that of Nicati, using first an instillation of cocain-adrenalin and then a solution of sulphate of copper.

These injections are given twice a week. The injection is made longitudinally in the superior retrotarsal fold. There is an intense tumefaction and swelling and some pain which disappears by the next day. The patients are usually given 5 grains of aspirin to take at home. 47 severe cases are reported as follows:

Cured	28	58.3%
Notable amelioration..	12	25 %
Slight amelioration....	3	6.25%
No action	5	10.4%

The conclusion is that subconjunctival injections of sulphate of copper offer a rapid cure for trachoma, especially cases in the early stages.

H. V. W.

Pickard, Ransom. Cavernous Optic Atrophy and Glaucoma. Brit. J. Ophth., Aug. 1925, v. 9, p. 385.

The author maintains that cavernous atrophy is a distinct entity, that its association with glaucoma is casual and not causal.

By means of charts and diagrams, he deals with seven case reports. In order to illustrate the close resemblance to and the difference between cavernous atrophy, one case report of chronic glaucoma and one of relative glaucoma are detailed.

None of the cases in the group reported had any nerve symptoms; where the lamina was exposed the discs were pale, vision is with correcting lenses; tension by the Schiötz tonometer; the percentage of disc cup is by the author's method (Brit. J. Ophth., p. 81, 1923.) The cases recorded bear a close resemblance to glaucoma in the fields, loss of central vision and cupping, but they differ in not having rise of tension and in the color field conforming to the atrophic type. In glaucoma, the white and color field is generally lost in the same proportion, the meaning of which is that the nerve fibers are equally destroyed by pressure. In support of the author's contention that the cases reported are different from glaucoma, he points out that in a certain number of the cases, the eye with smaller disc cup showed greater field alteration than the fellow eye with larger cup. In no case was the tension over 28 mm. of Hg. Glaucoma is a condition of increased pressure, the condition under consideration is to be looked upon as diminished resistance of the nervehead.

The group discussed constitutes a distinct entity with differences which separate it from ordinary optic atrophy on the one hand and glaucoma on the other. D. F. H.

Wright, Major R. E. Cyst of the Iris. Brit. J. Ophth., v. 9, No. 9, Sept. 1925.

Wright observed in a Hindu female, aged 20 years, a cyst in the lower nasal quadrant. He decided to try the effect of killing the cells of the lining membrane. With two Alston syringes armed with short fine needles, he punctured the cyst wall from opposite directions. He aspirated with one. Detaching the syringe, he loaded it with a few drops of pure carbolic acid and refilled the cyst, immediately aspirating. The second syringe being filled with saline solution was used to wash the cyst while the first syringe was used to withdraw the fluid until there is no free carbolic acid left in the cyst. Upon examination about five months later the pupils were equal; a layer of pigmented deposit lined the back of the cornea in the position occupied by the cyst. One illustration accompanies the contribution. D. F. H.

Wood, D. J. Two Cases of Non-Traumatic Cysts of the Anterior Chamber. Brit. J. Ophth., v. 9, No. 9, Sept. 1925.

Both cases were in young girls, similarly located in the lower inner quadrant of the right eye. In one case the cyst was ruptured; later it returned, at which time a limbal incision was made thru which the cyst wall and iris stroma were drawn out and cut off. In the second patient upon observation some three months later, it was noted that the cyst had ruptured. Three months subsequently it again reappeared. This afforded the reporter opportunity for examination with the slit lamp. The cyst had intruded itself between the uvea and the stroma. The posterior wall showed a beautifully scalloped structure. There were six main divisions separated by well defined ridges making the cyst look like a parachute rather than a balloon. The ridges start up abruptly from a small area of flat uveal tissue in the center of the lowest part of the cyst. The appearance suggested that the cyst must have arisen from the very angle of the anterior chamber, probably from the pectinate ligament. The slit lamp indicated clearly the reason for failure to remove the cyst without the iris. Three illustrations accompany the contribution. D. F. H.

Holm, Ejler. Etiology and Pathogenesis of Myopia. Hospitalstidende, 1925, v. 68, pp. 697-741.

The article is well written and shows evidence of careful work. The theory is advanced that there exists an interrelation between the activity of the ciliary muscle and the growth of the eyeball; that the ciliary tonus furnishes a stimulation to such a growth; and than an overuse of the ciliary muscle by much near work causes an overgrowth of the eyeball, (i. e. an abnormal length of the antero-posterior axis) and hence myopia.

The theory is based on the following considerations: in babyhood in a normal individual, there is a marked hypermetropia due to a shortness of the eyeball; as the child begins to use the eyes, the hypermetropia is overcome by ciliary effort. This marked ciliary tonus stimulates a corresponding growth of the eyeball. Before adult age is reached the eye is emmetropic; by this time the ciliary tonus is lessened and a balance of the two factors is reached. It is well known that myopia is many times more frequent among young people who do much near work, than among those who do not. The myopia in the former is due to an overgrowth of the eyeball produced by an abnormal or unusual ciliary effort from the prolonged use of accommodation.

Heredity also plays a part. Myopia appears much more rapidly in an individual whose father or mother is myopic. If the hereditary factors are numerous, a form of myopia appears which seems to be independent of other considerations. D. L. T.

Lagrange, Henri. Derangements of Organo-Vegetative Nervous and of Endocrinian System in Essential Glaucoma. Brit. J. Ophth., 1925, v. 9, p. 398.

The author discusses in detail the clinical features connected with the

case of a female, aged 20 years, who at the catamenia suffered recurring glaucomatous attacks. Various phenomena of pluriglandular disturbances were presented. Under treatment which acted only on the menses, the rhythm of the periods returned to normal and the glaucomatous attacks disappeared.

Whatever the importance of the role played by the endocrinian glands, it is not possible to say at the present moment if their alterations are the starting point of all these disturbances, or if they have only an intermediary role. But the mechanism of the attack of glaucoma seems to be linked in its ensemble to the disturbance of the innervation system of the ocular globe.

The author's concluding statement is "at the base and at the beginning of every primary glaucoma, there is an intervention of the sympathetic nerve or, if one wants to be less precise, of the secretory nerves." D. F. H.

Traquair, H. M. Acute Retrobulbar Neuritis Affecting the Optic Chiasma and Tract. Brit. J. Ophth., v. 9, No. 9. Sept. 1925.

This type of retrobulbar neuritis has an onset and course the same as when the disturbance is in the optic nerve. Headache and visual defects are common. The field changes are hemianopic with central scotoma with many combinations and variations. An outstanding feature is the wandering character of the defects, the previously involved portions recover their function. They are inflammatory or degenerative conditions primary in this part of the visual path; in a measure related to multiple sclerosis. Altho in tumor cases alterations in the field occur, in retrobulbar neuritis, the fleeting, rapidly variable character of the defects is typical. The prognosis is good but should be guarded in respect to later development of disease of the nervous system. Four excellent case histories are discussed in detail, accompanied by nineteen field charts. D. F. H.

Maucione. Inoculation of Leprosy in Anterior Chamber of Rabbit. Arch. di. Ottal., 1924, 31, p. 385.

A review of the literature shows a marked difference of opinion as to whether the lepra bacilli multiply in the anterior chamber or not. The author's first case, was a case of generalized leprosy with ocular involvement. Four rabbits were inoculated with material from a leproma of the arm. Only one showed a positive result. The piece of tissue inoculated commenced to increase in size after thirty-five days, after ten months filling most of the anterior chamber. Sections showed lepra bacilli in the necrotic tissue. The iris was not involved. Two rabbits inoculated from the material in the anterior chamber gave negative results.

His second case showed leprous nodules on the limbus in which bacilli were found. Excised fragments were used for inoculation in the anterior chamber, the vitreous, the ear vein, the pleural cavity, the scarified cornea and subconjunctivally. In most of these the results were negative. One rabbit inoculated in the anterior chamber showed granulomata similar to those in the first case. Sections of the eye enucleated after nine months showed a typical granuloma with much necrosis, giant cells and a few lepra bacilli. The cornea was involved only where it was in contact with the inoculated tissue but there was no evidence of a spreading of the disease into other healthy tissues. Cultures and animal inoculations of this material were negative. Of 8 animals inoculated intracorneally, 4 gave positive results. One showed an appearance of many small nodules which fused to form an ulcer which healed slowly. Complement fixation reactions done on the rabbits at various stages with leprous and luetic antigen were all negative. (Lepra bacilli were found only in the central part of the necrotic tissue, were changed in morphology, and did not grow on culture). The author concludes that the bacilli do not multiply in the anterior chamber. The granu-

loma is only the reaction to the necrotic tissue used in the inoculation.

S. R. G.

Sarnelli. Trachoma in Relation to Race in Tripoli. Arch. di Ottal, 1924, v. 31, p. 416.

This report from a country with a mixed population, heavily infected with trachoma, affords interesting information on the reputed immunity to trachoma of the black race. Sarnelli found that the black race, while not immune, was much less often affected than other races. Among the negroes trachoma was 1/6 as frequent as among the Arabs as shown by the record of the clinic for five years. A similar relation was found in children of school age in the native villages compared to Arab children in the schools, 10% of the black children being affected while 50% to 70% of Arabs were affected. To determine whether lymphatism is a predisposing cause in trachoma, a series of trachomatous and healthy Arabs and negroes were examined. It was found that most of the trachomatous Arabs showed signs of lymphatism and it was rare for a perfectly healthy Arab or negro to be affected. The white blood count was shown to be raised in trachomatous Arabs almost uniformly. The author believes the rarity of lymphatism among the negroes accounts for the racial immunity to trachoma.

S. R. G.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply news from their respective sections: Dr. H. Alexander Brown, San Francisco; Dr. Wm Thornwall Davis, Washington; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. George F. Keiper, LaFayette, Indiana; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. George H. Kress, Los Angeles; Dr. Edward D. LeCompte Salt Lake City; Dr. W. H. Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Charles P. Small, Chicago; Dr. G. McD. VanPoole, Honolulu.

DEATHS

Dr. John Frederick Herbert, Philadelphia; aged sixty-five, died October twelfth.

Dr. Everard W. E. Patterson, Grand Rapids, Michigan; aged fifty-five, died October twenty-sixth.

Dr. Frank G. Hackleman, Rushville, Indiana; aged sixty-six, died October ninth, following a long illness.

Dr. John D. Pifer, Morgantown, West Virginia, formerly of Joplin, Missouri; died August twenty-fifth, following a long illness, aged 62 years.

Announcement has recently been made of the deaths of Dr. F. Tartuferi, professor of ophthalmology, Bologna; Dr. Terson, formerly professor of ophthalmology, Toulouse; Dr. E. Franke, professor of ophthalmology, Hamburg; and Dr. C. Bliedung, privat-dozent of ophthalmology, Greifswald.

SOCIETIES

The October meetings of the Kansas City Eye, Ear, Nose and Throat Society was held in connection with the Fall Conference of the Kansas City Clinical Society. Dr. John E. Weeks of New York City and Dr. Roy B. Canfield of Ann Arbor, Michigan, were the guests of honor.

A very interesting program was presented by the section on Ophthalmology of the College of Physicians of Philadelphia on Thursday, November nineteen, in which the following gentlemen participated: Drs: Warren S. Reese, William Campbell Posey, G. Oram Ring, Leighton F. Appleman, S. S. Greenbaum, Frederick H. Krauss and John C. Plumer.

The officers of the Minnesota Academy of Ophthalmology and Oto-Laryngology for 1925-26 are, Dr. D. L. Tilderquist, President; Dr. Elwyn R. Bray, St. Paul, First Vice-president; Dr. John M. Robinson, Duluth, Second Vice-president; Dr. John H. Morse, Minneapolis, Secretary-Treasurer.

At the October meeting of the Academy of Ophthalmology and Oto-Laryngology in Chicago, Dr. Edward C. Ellett, Memphis, Tennessee, was installed as president, Dr. Ross H. Skillern, Philadelphia, was made president-elect and Drs. Austin A. Hayden, Chicago, William C. Finnoff, Denver, and George L. Tobey, Jr., Boston, vice-presidents. Dr. Luther C. Peter, Philadelphia, was continued as secretary, Dr. Secord H. Large, Cleveland, treasurer, and Dr. Clarence Loeb, Chicago, editor of the Transactions. The next meeting will be at Colorado Springs, September, 1926.

PERSONALS

Dr. George W. Jean of Santa Barbara has reopened his office at La Morada.

Dr. Jeffrey J. Walsh has been elected president of the Rhode Island Ophthalmological Society.

Dr. Beulah Cushman has been elected secretary of the Chicago Council of Medical Women.

Dr. Max L. Folk has been appointed associate in ophthalmology at the Michael Reese Hospital, Chicago.

Dr. Donald H. O'Rourke announces his resignation from the United States Navy and his association with Drs. Edward Jackson and William C. Finnoff of Denver, Colorado.

Dr. M. Paul Motto of Cleveland, Ohio, was recently promoted to the rank of instructor in the department of ophthalmology of the Western Reserve University School of Medicine.

Dr. L. Webster Fox of Philadelphia has been appointed by Governor Pinchot a member of the State Council for the Blind. This council was created by an act of the Assembly last winter.

Dr. Benjamin Franklin Royer of Philadelphia has been appointed medical director of the National Committee for the Prevention of Blindness. This committee will now be in a position to cooperate more extensively than in the past with the medical profession and with local health officers and associations.

Professor L. Koeppe completed the first Slit Lamp course given at the New York Eye and Ear Infirmary on September twenty-sixth. The following ophthalmologists attended: Doctors F. W. Shine, C. E. McDannald, B. W. Key, J. Wolff, M. L. Berliner, T. H. Johnson, W. W. Weeks and G. W. Jean.

Dr. Thomas Hall Shastid, Superior-Duluth, on November 24 delivered at the Mayo Clinic, Rochester, Minn., a lecture on "Animals' Eyes and What They Teach Us About Our Own." Preceding the lecture a dinner was given to Dr. Shastid, and, following the talk, a general discussion of the subject was held.

MISCELLANEOUS

St. Joseph's Home for the Blind, Jersey City, was left $1,000 under the will of the late Nellie Lynn, Philadelphia.

By the will of the late Mary L. Fraser, the Brooklyn Home for Blind and Crippled Children was left $5,000.

The New York Association for the Blind and the Knapp Memorial Eye Hospital received $5,000 each by the will of William E. Stiger, New York.

The Todd Memorial Hospital of the University of Minnesota for eye, ear, nose and throat patients was opened early in October.

An examination was held by the American Board of Oto-larynology on October 19, 1925 at the Cook County Hospital, Chicago, with the following result: Passed, 120; failed, 23. The next examination will be held in Dallas, Texas on April 19, 1926. Applications may be secured from the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

A report on "Conserving the Sight of School Children" has been made recently by a joint committee of the American Medical Association and the National Education Association in cooperation with the National Committee for the Prevention of Blindness. The committee studied the practices followed in public schools in caring for the eyesight needs of school children in 375 cities, also in rural districts of every state and was assisted by one hundred ophthalmologists and by health officials and school authorities. It was found that three million school children of this country are handicapped by defective sight and that only half of the total school population of twenty-four million have their eyes examined and vision tested while attending school. The rural districts generally report a larger percentage of defective vision than the cities. This may be due to differing factors and conditions under which the test results were obtained. The committee was at work more than a year under Dr. Thomas D. Wood, professor of physical education, Columbia University, New York. It recommends that a uniform law for the examination of the eyes of school children be adopted by all states and cities.

Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-faced type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) mean bibliography and (Dis.) discussion published with a paper.

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